Taxonomic Studies on the Talitridae (Crustacea, Amphipoda) from Taiwan -I. The genera Talorchestia and Sinorchestia n. gen.-

AUTHOR(S):

Miyamoto, Hisashi; Morino, Hiroshi

CITATION:

Miyamoto, Hisashi ...[et al]. Taxonomic Studies on the Talitridae (Crustacea, Amphipoda) from Taiwan -I. The genera Talorchestia and Sinorchestia n. gen.-. PUBLICATIONS OF THE SETO MARINE BIOLOGICAL LABORATORY 1999, 38(5-6): 169-200

ISSUE DATE:

1999-09-30

URL:

http://hdl.handle.net/2433/176289

Publ. Seto Mar. Biol. Lab., 38 (5/6): 169–200, 1999

Taxonomic Studies on the Talitridae (Crustacea, Amphipoda) from Taiwan I. The genera *Talorchestia* and *Sinorchestia* n. gen.

Hisashi Miyamoto[1] and Hiroshi Morino[2]

[1]Jin-Ai Girl's Senior High School, 4–9–24 Houei, Fukui 910–0004, Japan
[2]Department of Environmental Sciences, Ibaraki University, Mito 310–8512, Japan

Abstract As the first report of taxonomic studies on the Talitridae collected from the mainland and neighboring islands of Taiwan, two genera and four species from supralittoral zones were described or redescribed: *Sinorchestia* gen. n. (*S. sinensis* (Chilton, 1925) comb. n. and *S. taiwanensis* sp. n.) and *Talorchestia* sensu Morino & Miyamoto, 1988 (*T. martensii* (Weber, 1892) and *T. mindorensis* Oleröd, 1970).

Key words: Amphipoda, Talitridae, *Sinorchestia* gen. n *Talorchestia*, taxonomy, Taiwan, distribution

Introduction

The faunal and distributional studies of talitrid amphipods from Taiwan have received scant attentions. So far only two species have been recorded from inland Taiwan: *Orchestia* (=*Platorchestia*) *platensis* by Iwasa (1939) and *Bousfieldia phoenixae* by Chou & Lee (1996), but no supralittoral forms have been documented. It is reasonable to expect the occurrence of supralittoral forms from Taiwan because of their high diversity in North Pacific shore lines (Bousfield, 1982). Also the inland habitats of Taiwan, which are characterized by the subtropical climate and a high annual rainfall, could harbor a much richer fauna of terrestrial forms than hitherto reported (see Bousfield, 1984).

Thus in order to make an extensive faunal survey, the senior author has made expeditions three times from 1976 to 1981, covering 43 collecting points in the mainland and neighboring islands, Lan-Hsu, Lu-Tao, Peng Hu Lie-Tao (Fig. 1). As a result of the expeditions, 14 species were collected from supralittoral and inland regions, including several new taxa. As the first report, two species of the new genus *Sinorchestia*, *S. sinensis* (Chilton, 1925) and *S. taiwanensis* n. sp. and two species of the genus *Talorchestia* sensu Morino & Miyamoto, 1988, *T. martensii* (Weber, 1892), *T. mindorensis* Oleröd, 1970 are treated herewith.

All materials were collected by the senior author. The type materials of *S. taiwanensis* n. sp. will be deposited in the collection of the National Museum of Natural Science of Japan (NSMT) and the National Museum of Natural Science, Taichung, Taiwan (NMNS), the Canadian Museum of Nature in Ottawa, Canada (NMC). All other materials are deposited in Miyamoto's collection. The specimen number is given in parenthesis after each specimen in Figure legends.

The following abbreviations are used in the figures presented. A1, A2: antenna 1, 2; Bp2–Bp5: brood plates of pereopods 2–5; Cg2–Cg5: coxal gills of pereopods 2–5; Gp1, Gp2: gnathopod 1, 2; Gp1c: a collar tipped spine of gnathopod 1; Gp1d: distal part of gnathopod 1; Gp2d: dactyl of gnathopod 2; Ll: lower lip; Lm: left lacinia mobilis; M1, M2: maxilla 1, 2; Md: mandible; Mp: maxilliped; Mpa: inner distal corner of outer plate lobe of maxilliped; Mpt: trident spines of palp article 3 of maxilliped; P3–P7: pereopods 3–7; Pl1–Pl3: pleopods 1–3; Ppd: dactyl of pereopod; Rm: right lacinia mobilis; S: scale; Sp1–Sp3: abdominal side plates 1–3; T: telson; Ul: upper lip; Up1–Up3: uropods 1–3; Up3d: distal part of uropod 3; (d): dorsal view; (v): ventral view.

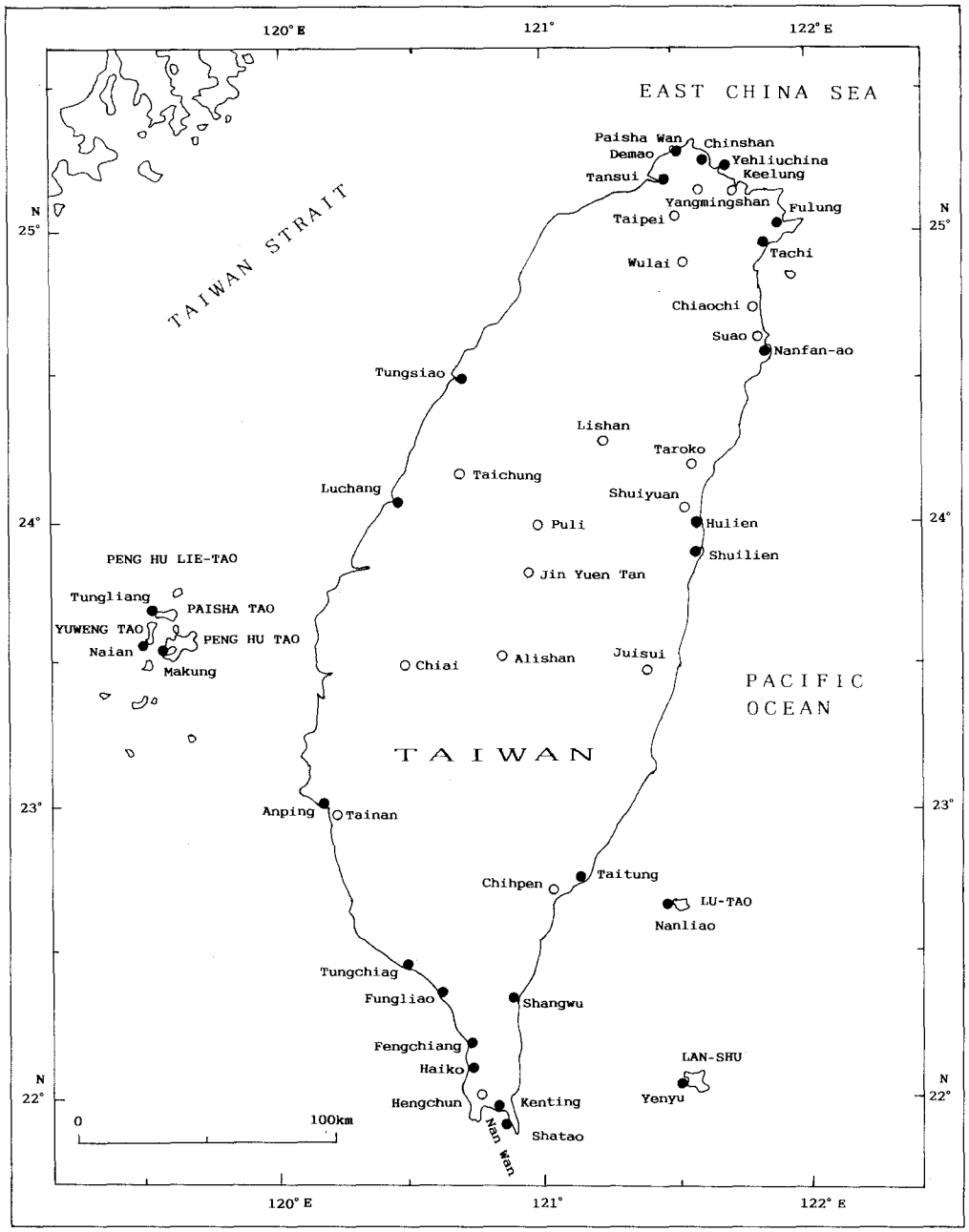

Fig. 1. Map showing 43 sampling localities in the mainland and neighboring islands of Taiwan. Localities where the talitrids were collected: ●; those not found: ○.

The spelling of locality names in Taiwan follows Tanaka (1982).

Genus *Talorchestia* Dana, 1852, amend. Morino & Miyamoto, 1988

Remarks

Morino & Miyamoto (1988) redefined the genus *Talorchestia* to receive four Indo-Pacific

species: *T. gracilis* (Dana, 1852), *T. martensii* (Weber, 1892), *T. spinipalma* (Dana, 1852) and *T. palawanensis* Morino & Miyamoto, 1988. *Talorchestia mindorensis* Oleröd, 1970 described from Mindoro Is. in the Philippine Archipelago, was not treated by Morino & Miyamoto (1988), but apparently belongs to this genus. The new generic proposal was supported by Bousfield (1991). Bellan-Santini & Ruffo (1991), on the other hand, did not accept it, since it was established on the basis of partial material of *Talorchestia* s. l. They described a new species *Talorchestia ugolinii* Bellan-Santini & Ruffo, 1991 from the Mediterranean Sea. However, this species has hardly any diagnosis of *Talorchestia* sensu Morino & Miyamoto, 1988 except for features of female gnathopods 1 and 2, and the male antenna 2. This species is close to the genus *Pseudorchestoidea* Bousfield, 1982 in having the following features: pereopod 5 with very short, expanded dactyl; uropod 3 with elongate ramus, etc. *Talorchestia mindorensis* supports an Indo-Pacific cluster of *Talorchestia* s. l., which validates the concept of *Talorchestia* sensu Morino & Miyamoto 1988.

***Talorchestia martensii* (Weber, 1892)**

(Figs. 2–6)

Orchestia martensii Weber, 1892; p. 564, figs. 13–16.

Talorchestia martensii: Stebbing, 1906, p. 553; Chilton, 1921, pp. 541–545, fig. 8; Morino & Miyamoto, 1988, p. 97.

Material examined.

11 males and 2 females (1 ovig.) from Fulung, 31 Jul. 1981; 5 males and 3 females (1 ovig.) from Demao, 18 Aug. 1981; 1 male and 10 females (3 ovig.) from Tungsiao, 30 Jul. 1976; 2 males and 9 females (3 ovig.); from Kenting, 1 Aug. 1979; 5 males and 19 females (1 ovig.); from Tungchiag, 3 Aug. 1979; 2 males and 1 female from Anping, 5 Aug. 1979; 10 males and 6 females (2 ovig.) from Makung, 12 Aug. 1981.

Description of Male

Body length 8 to 11 mm. Eyes medium large, round. Inferior antennal sinus shallow. Antenna 1 reaching midpoint of peduncular article 4 of antenna 2; peduncular article 2 longest, as long as peduncular articles 1 and 3 combined; flagellum ca. 0.5 times as long as peduncle, 5 to 6-articulated. Antenna 2 very long, 0.5 to 1.0 times as long as body length; peduncular article 4 ca. 1.3 times as long as head length, thicker than peduncular article 5, peduncular article 5 ca. 1.5 times as long as peduncular article 4; flagellum 0.8 to 1.2 times as long as peduncle, 20 to 30-articulated, 2 or 3 proximal articles coalesced.

Upper lip deeper than wide, ventral margin and distal surface pilose. Lower lip: inner shoulder and margin of central trough pilose. Left mandible: incisor 6-dentate; lacinia mobilis 5-dentate, with 6 lifting spines. Right mandible: incisor 6-dentate; lacinia mobilis tricuspate, ridge of each cusp minutely serrated, proximal part scaled, with 4 lifting spines. Maxilla 2: distal margins of outer and inner plates oblique, with rows of sharp spines and smooth blunt spines, outer plate with several long sharp spines near outer distal angle, inner plate with 2 long sharp spines on outer distal angle, with 2 lifting spines medially, terminal one strong. Maxilla 1: outer plate with 9 saw-like spines on distal margin, each spine with 2 to 5 denticles, with a row of fine spines in parallel with saw-like spines on ventral side, palp minute, 2-articulated; inner plate narrow, with 2 long lifting spines at apex. Maxilliped: inner plate with 3 unequal dents on distal margin, with lifting spines on outer distal angle, subdistal and inner margins; lobe of outer plate shorter than basal height, with 5 to 6 lifting spines on distal margin, inner distal corner angular; palp

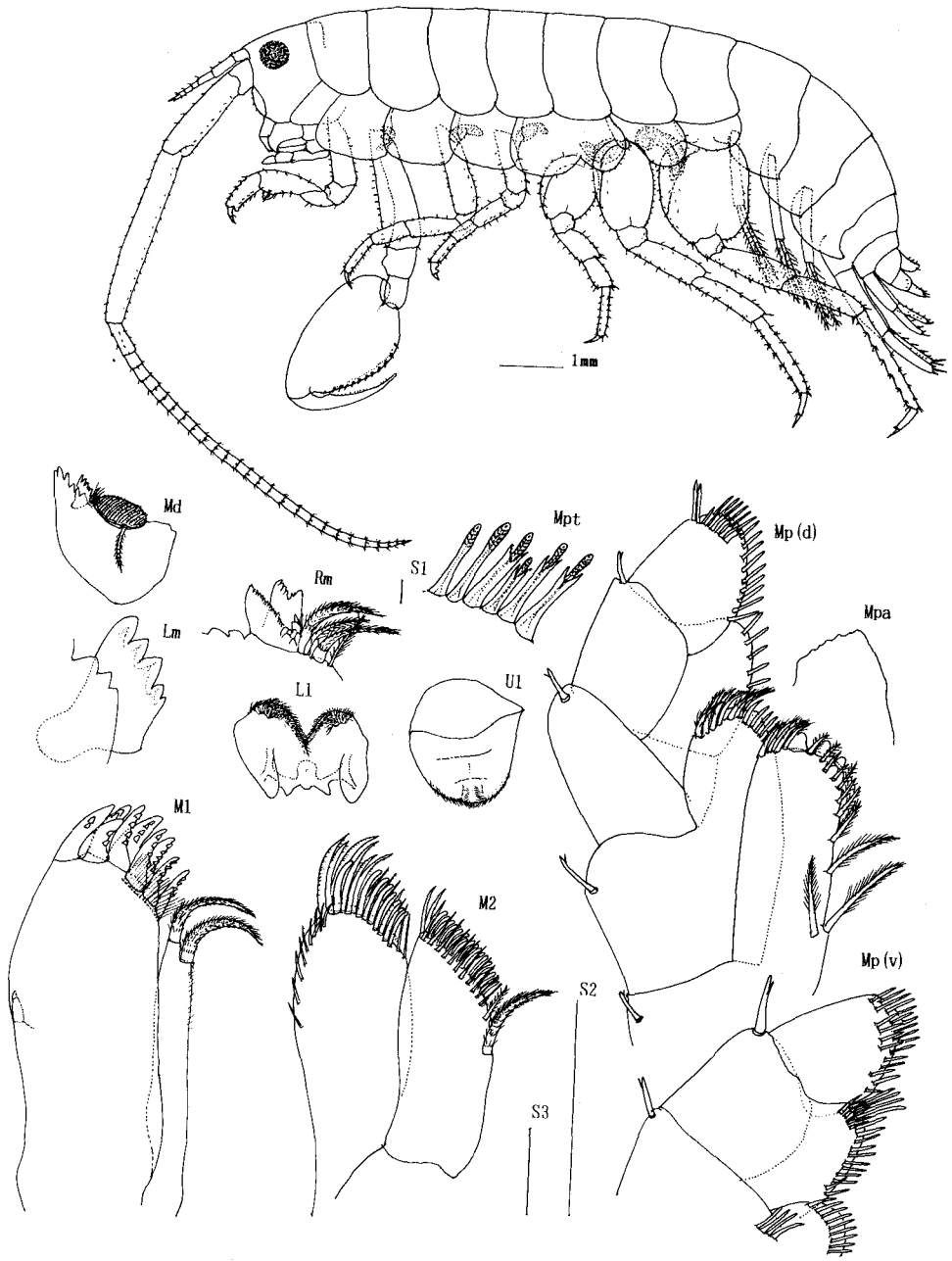

Fig. 2. *Talorchestia martensii* (Weber, 1892) from Fulung. Male, 11 mm long (TF81M111). A lateral view and mouth parts. Mpt: S1; Ll, Md, Ul: S2; Lm, M1, M2, Mpa, Mp(d), Mp(v), Rm: S3. S1=0.01 mm, S2=1 mm, S3=0.1 mm.

article 2 broad, inner margin spinose; palp article 3 subconical, inner margin spinose, with a transverse row of 6 to 7 spines, including 4 trident spines (Fig. 2 Mpt), on subdistal part of dorsal surface, inner subdistal margin of ventral surface spinose; palp article 4 indiscernible.

Gnathopod 1: anterodistal angle of coxal plate subacute, ventral margin spinose; basis

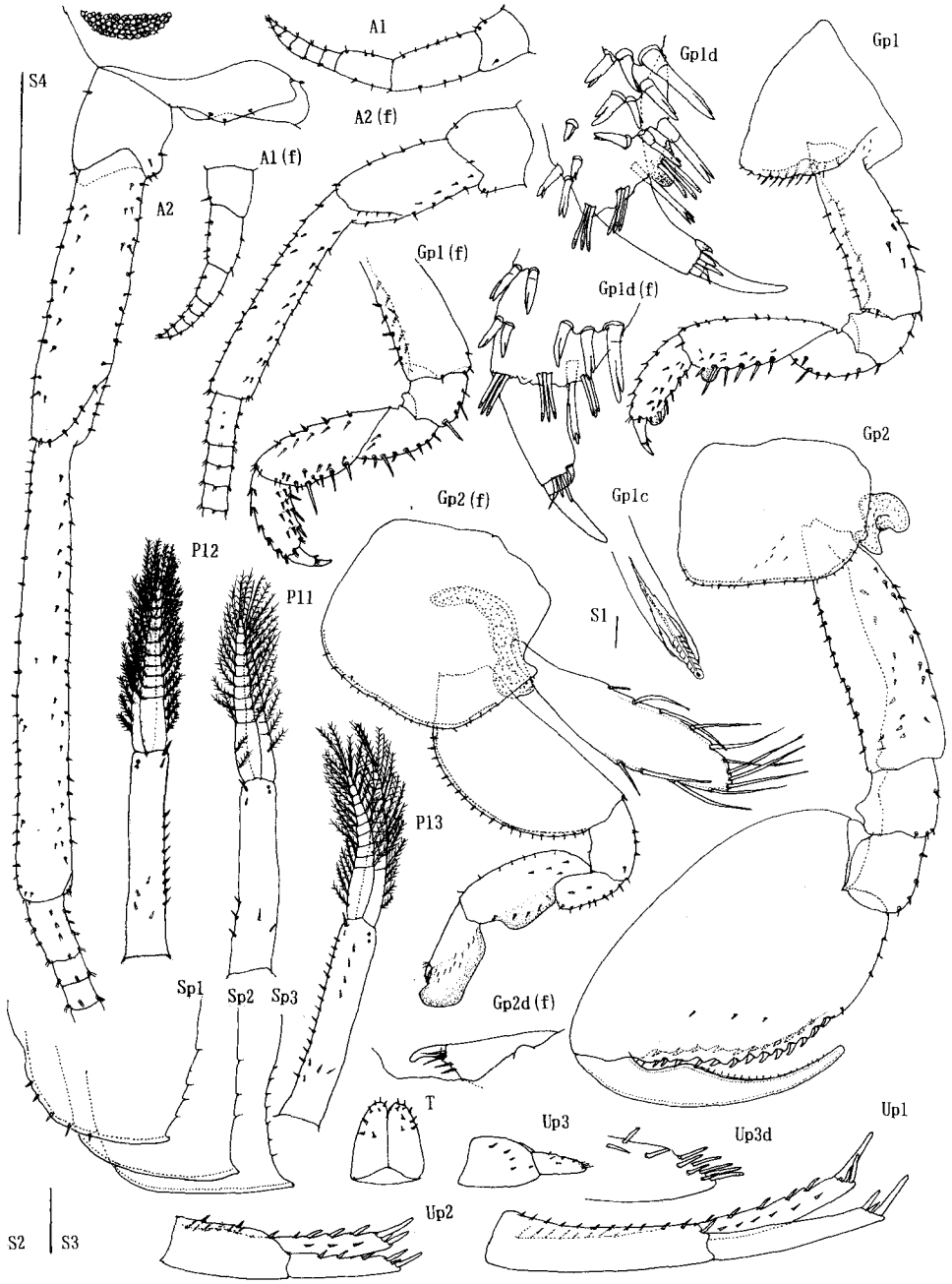

Fig. 3. *Talorchestia martensii* (Weber, 1892) from Fulung. Male, 11 mm long (TF81M111) and female (f), 11 mm long (TF81M121). Gp1c: S1; Gp2d(f): S2; Gp1d, Gp1d(f), Up3d: S3; A1, A1(f), A2, A2(f), Gp1, Gp1(f), Gp2, Gp2(f), P11–P13, Sp1–Sp3, T, Up1–Up3: S4. S1=0.01 mm, S2=0.1 mm, S3=0.1 mm, S4=1 mm.

subtriangular in cross section, both inner and outer anterior margins almost straight, spinose, posterior margin weakly curved, with several spines; merus without tumescent hump, posterior margin spinose; carpus ca. 3.0 times as long as ischium, with cylindrical tumescent hump

on posterosubdistal angle and a long spine at base of hump; propod subrectangular, ca. 0.5 times as long as carpus, with tumescent hump at posterodistal angle, with 3 to 4 transverse spines-rows of 3 to 4 bifid spines (Fig. 3 Gp1d, Gp1d (f)) on posterior side of outer surface, posteromost spine of each row longest, subdistal margin of inner surface with a collar tipped spine (Fig. 3 Gp1c) near dactylar hinge, palm very short; dactyl base with a single stiff spine on posterosubdistal angle and with 3 setae on distal margin, without a denticle on anterodistal angle, both margins smooth, dactyl nail subequal to dactyl base in length. Gnathopod 2: coxal plate wider than deep, ventral margin straight, spinose, posterior margin slightly oblique, posterior cusp very small, acute; basis sickle-shaped in cross section, inner distal angle produced anteriorly, surface and margins spinose; posterodistal angle of merus rounded, not produced, posterior margin spinose; propod large, oval, posterior margin ca. 0.3 times as long as anterior margin, almost straight, with a few spines, palm oblique, lacking defined bulge, serrated, with 2 rows of 11 to 15 spines for each; dactyl curved distally, grasping margin sinuous, concaved near dactylar hinge, spinulose.

Pereopods 3 to 7 cuspidactylate; propod with a distal spine at dactylar hinge; dactyl base with a stiff spine on concave margin. Pereopods 3 and 4: coxal plates wider than deep, ventral margin straight, spinose, posterior cusp obtuse; basis almost parallel sided; merus subequal to propod in length, carpus shortest, posterior margins of merus and carpus with denser spines than anterior margins; dactyl base shorter than ischium. Pereopod 3: length of carpus 2.5 to 2.6 times as long as width. Pereopod 4 shortest, ca. 0.7 times as long as pereopod 3; length of carpus 1.6 to 1.7 times as long as width; dactyl base ca. 0.7 times as long as ischium, strongly pinched, shoulder of depression protruded weakly. Pereopods 5 to 7 heteropodous; posteromarginal spines of basis smaller and denser than those of anteromarginal ones, evenly set; posterior margins of carpus and merus with sparse spines, carpus with long spines on antero- and posterodistal angles; propod with several grouped spines on anterior and posterior margins evenly; posterior margin of dactyl base smooth. Pereopod 5 ca. 0.8 times as long as pereopod 3; anterior lobe of coxal plate larger than posterior one (ca. 1.8 times in width, ca. 1.2 times in depth), ventral margin gently curved, spinose; posterior margin of basis expanded roundly, anterior margin weakly curved, without posterodistal lobe; merus subequal to or slightly longer than carpus; propod ca. 1.2 times as long as carpus; dactyl base subequal to that of pereopod 3 in length. Pereopods 6 and 7: articles slender, increasing in length distally; propod with 2 groups of 2 parallel spines on both sides of distal angle dactyl base longer than ischium. Pereopod 6 ca. 1.5 times as long as pereopod 3; posterior lobe of coxal plate deeper than wide, ventrally rounded, with spines from anterior margin to ventral one; basis longish elliptic, posterior margin almost vertical, without posterodistal lobe; propod ca. 1.1 times as long as carpus. Pereopod 7 slightly longer than pereopod 6; coxal plate shallow, ventral margin weakly convex, spinose; posterior margin of basis almost vertical or slightly concaved, with posterodistal lobe; merus and carpus with grouped spines including long spines on anterior margin; propod ca. 1.3 times as long as carpus; dactyl base ca. 1.3 times as long as that of pereopod 6.

Coxal gills: gill of gnathopod 2 slender, extended anteriorly; gills of pereopods 3 and 4 small, hooked at middle; gill of pereopod 5 sack-like; gill of pereopod 6 longest, broadened at base, rolled to inside.

Abdominal side plates: side plate 1 with 5 to 6 spines on anteroventral angle. Posterior margin of each side plate sinuous, weakly serrate, with minute spines, posterodistal angle strongly protruded posteriorly.

Pleopods: peduncles with 2 retinaculae, with a downward spine on outer distal angle; peduncle of pleopods 3 subequal to that of pleopod 2 in length, with spines on outer margin

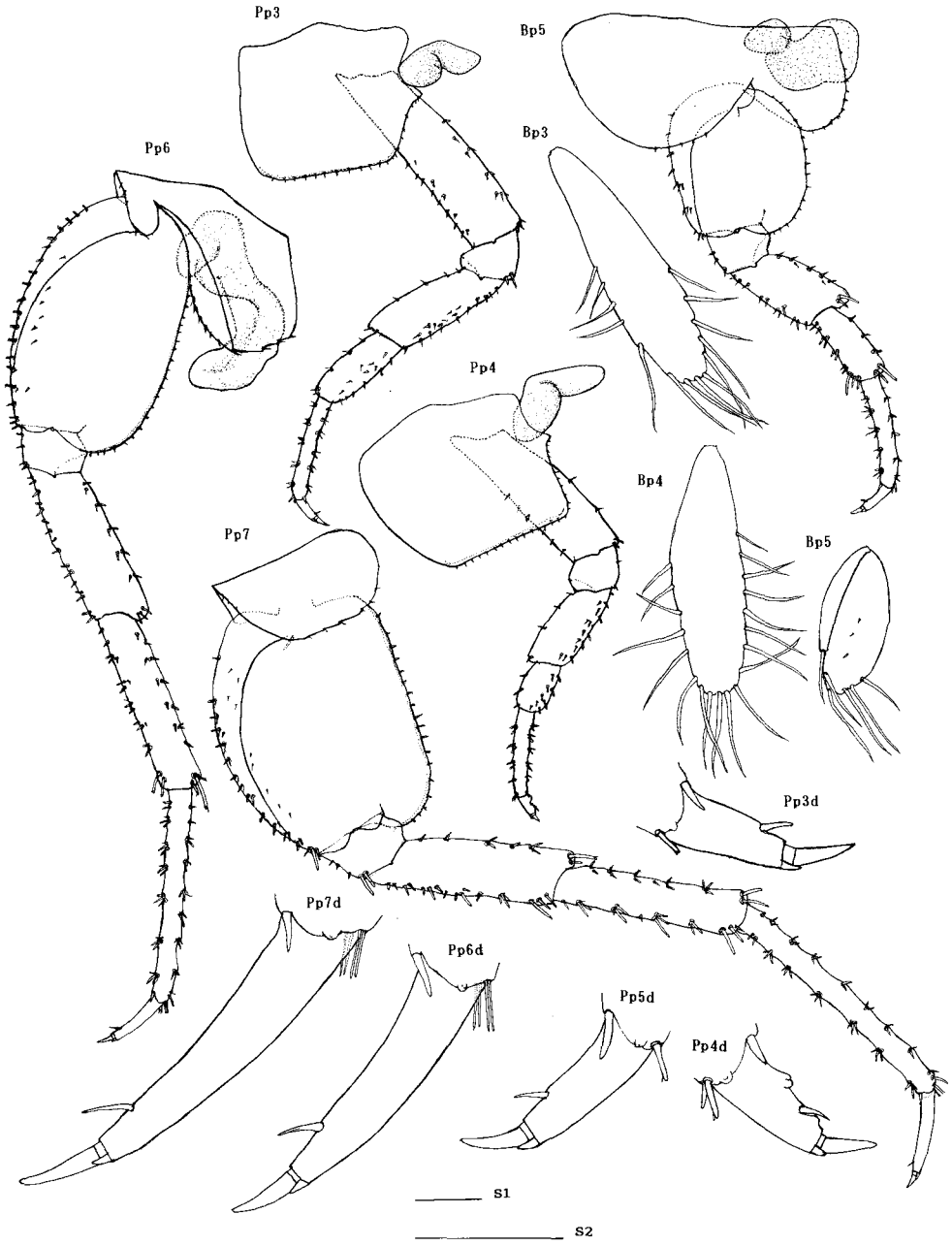

Fig. 4. *Talorchestia martensii* (Weber, 1892) from Fulung. Pereopod of male, 11 mm long (TF81M111) and brood plates of female, 11 mm long (TF81M121). Pp3d–Pp7d: S1; Bp3–Bp5, Pp3–Pp7: S2. S1=0.1 mm, S2=1 mm.

and surface except proximal part; peduncle of pleopod 2 with spines on middle part of outer margin and surface; peduncle of pleopod 1 with several spines on outer margin and surface of proximal part; rami shorter than peduncle, inner ramus 10 to 12-articulated, outer ramus slightly longer than inner ramus, 12 to 14-articulated.

Uropod 1: peduncle with 2 rows of marginal spines, with a small distolateral spine; outer ramus ca. 0.8 times as long as peduncle, marginally bare, inner ramus as long as outer ramus, with 5 and 6 spines on inner and outer margins respectively, both rami with distal spines (including 1 strong spine). Uropod 2 ca. 0.6 times as long as uropod 1, peduncle with 2 rows of marginal spines, rami slightly shorter than peduncle, inner ramus with 3 and 4 spines on inner and outer margins respectively, outer ramus with 3 outer marginal spines, both rami with distal spines. Uropod 3 ca. 0.3 times as long as uropod 1; peduncle longer than deep, dorsal margin curved, with several spines on outer surface; ramus ca. 0.8 times as long as peduncle, with a few spines on dorsal margin and with several spines of subequal length on truncated distal end.

Telson spade-shaped, ca. 0.6 times as long as uropod 3, with 8 to 10 spines marginally and facially on each lobe.

Female

Body length 9 to 11 mm. Antenna 1: flagellum ca. 0.4 times as long as peduncle, 5-articulated. Antenna 2 ca. 0.5 times as long as body length; peduncular article 5 ca. 2.0 times as long as peduncular article 4; flagellum ca. 0.9 times as long as peduncle, 19 to 20-articulated.

Gnathopod 1: carpus and propod lacking tumescent hump; propod ca. 0.5 times as long as carpus, slightly narrowing distally, palm defined by a group of 3 parallel spines, very narrow, ca. 0.3 times as long as width of dactyl base. Gnathopod 2: coxal plate as deep as wide, ventral margin weakly convex, posterior cups acute; basis expanded anteriorly, anterior margin with many spines evenly, posterior one with a few spines; merus subequal to ischium in length, posterior margin and lateral surface spinose; carpus ca. 1.7 times as long as ischium, tumescent posteroproximally, posterodistal corner angular, outer surface spinose laterally; propod shorter than carpus, tumescent, extends far beyond dactyl, with spines-row on lateral surface; dactyl nail hooked distally, grasping margin smooth.

Brood plates elongate oval, subequal to or slightly wider than basis of pereopod 3 in maximum width. Plate of pereopod 3 longest, with 16 to 18 simple tipped setae marginally. Plate of pereopod 4 subequal to that of gnathopod 2 in length, with 13 to 15 setae. Plate of pereopod 5 shortest, with 6 to 7 setae on distal margin and 3 spines on surface.

Remarks

The materials from Taiwan accord with the original description given by Weber (1892) from Flores Is. Chilton (1921) described and figured the antenna 2 of the materials from Chilka Lake, India as follows: 1) in fully developed males (body length 10 mm), the length is nearly as long as the body, 2) ultimate and penultimate joints of peduncle subequal and slender (in his figures, peduncular article 5 subequal to peduncular articles 3 and 4 combined in length), 3) flagellum 20-articulated, rather shorter than peduncle in his figures. In males larger than 10 mm body length from Taiwan, the peduncular article 5 is longer than peduncular articles 3 and 4 combined and the flagellum is longer than peduncle, 25-articulated. It seems that the elongation of male antenna 2 of material from Taiwan is largely by the size-dependent elongation of the peduncular article 5 and flagellar articles, as well as by an increase in the number of articles.

Talorchestia martensii is similar to *T. gracilis* (Dana, 1852) but the former is distinguished from the latter by the following features: 1) the male antenna 2 never exceeds the body length (vs. longer than the body length); 2) the peduncular article 5 of male antenna 2 ca. 1.5 times as long as the peduncular article 4 (vs. ca. 2.0 times); 3) the carpus of male

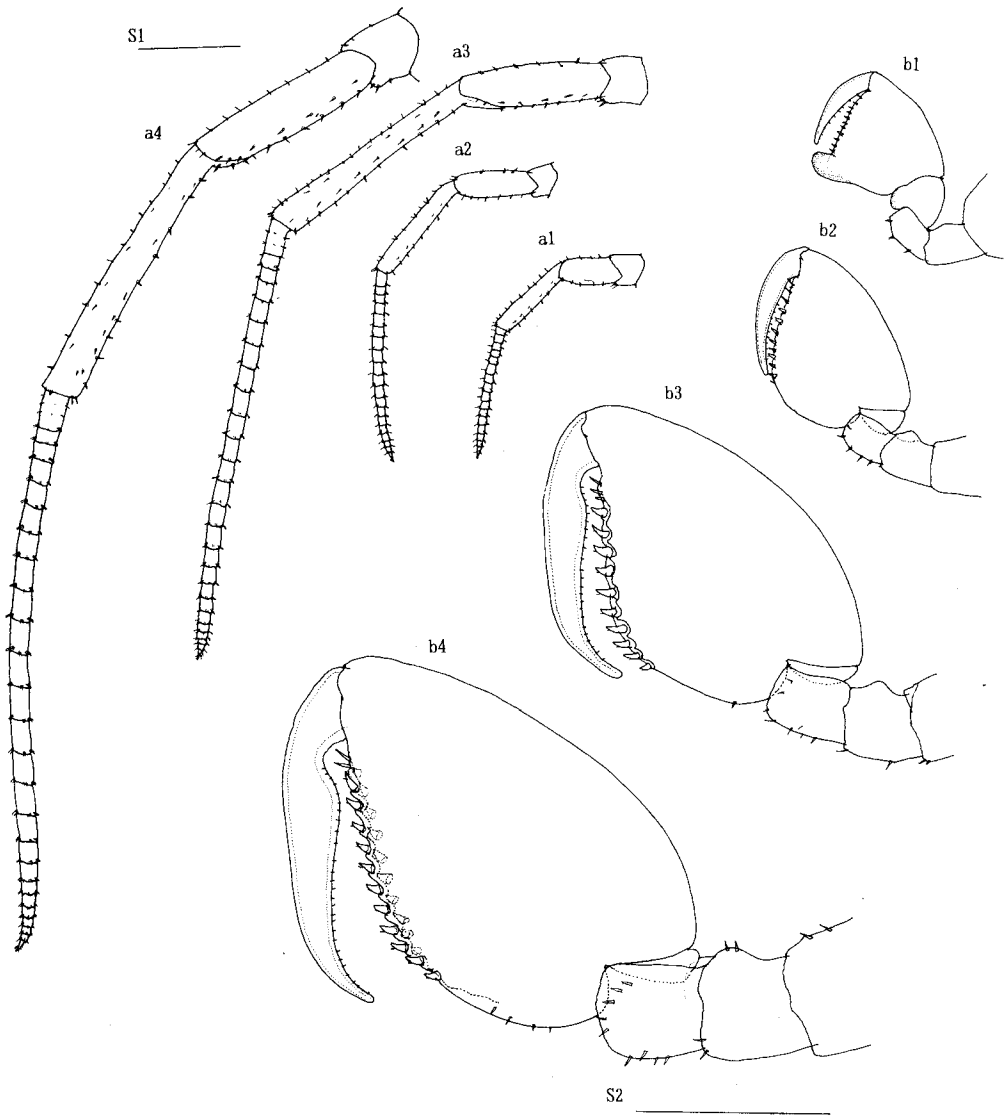

Fig. 5. *Talorchestia martensii* (Weber, 1982) from Kenting. Variation in male antenna 2 and gnathopod 2 with different sizes. a, A2: S1=1 mm; b, Gp2: S2=1 mm; 1, body length 6 mm; 2, 9 mm; 3, 10 mm; 4, 11 mm.

gnathopod 1 with tumescence (vs. without tumescence); 4) the dactyl of female gnathopod 1 long (vs. short); and 5) the peduncle of uropod 3 shorter than telson (vs. longer than telson).

Distribution in Taiwan

This species was found on sandy shores of the north coast (Demao, Fulung), of the south coast (Kenting, Tungchiag) and of the middle west coast (Anping, Tungsiao) of the mainland, and of the coast of Peng Hu Tao (Makung) of the Peng Hu Lie-Tao (Figs. 1 & 6).

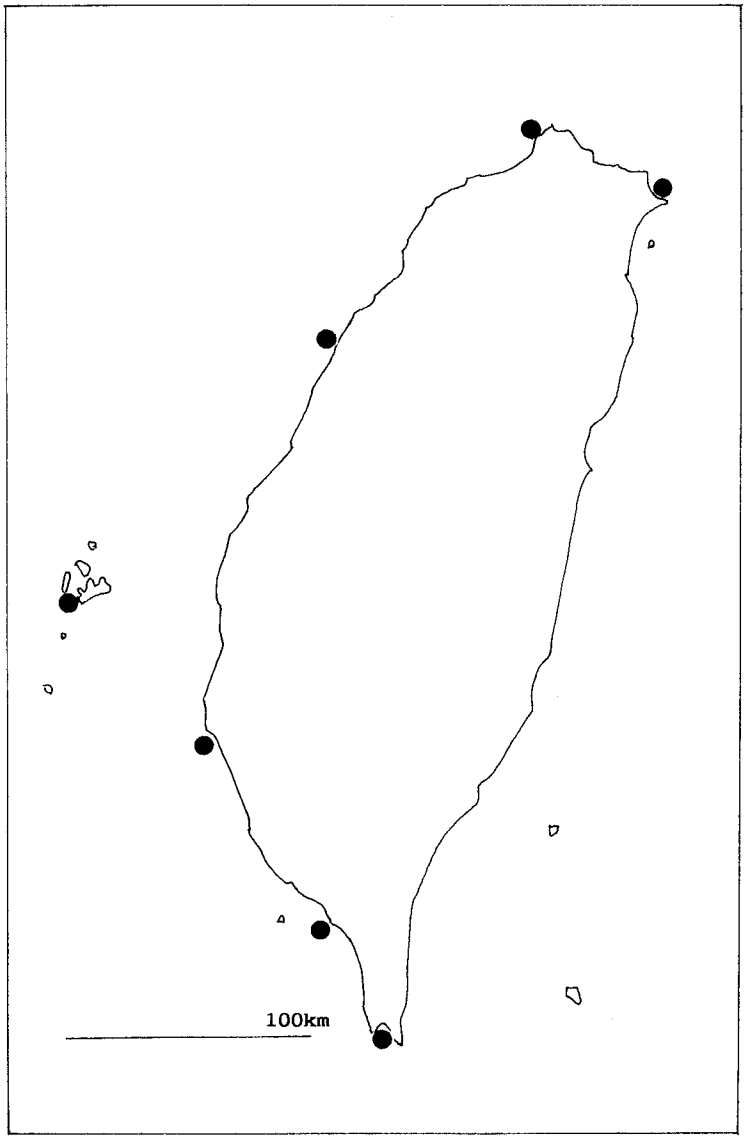

Fig. 6. Distribution of *Talorchestia martensii* (Weber, 1982) in Taiwan.

***Talorchestia mindorensis* Oleröd, 1970**

(Figs. 7–10)

Talorchestia mindorensis Oleröd, 1970; pp. 388–394, figs. 79–94.

Material examined

4 males and 6 females (3 ovig.) from Nanliao, 7 Aug. 1981; 1 male and 7 females (5 ovig.) from Shatao, 9 Aug. 1981.

Description of male

Body length 9 to 13 mm. Eyes medium large, subrounded. Antenna 1 reaching 2/3

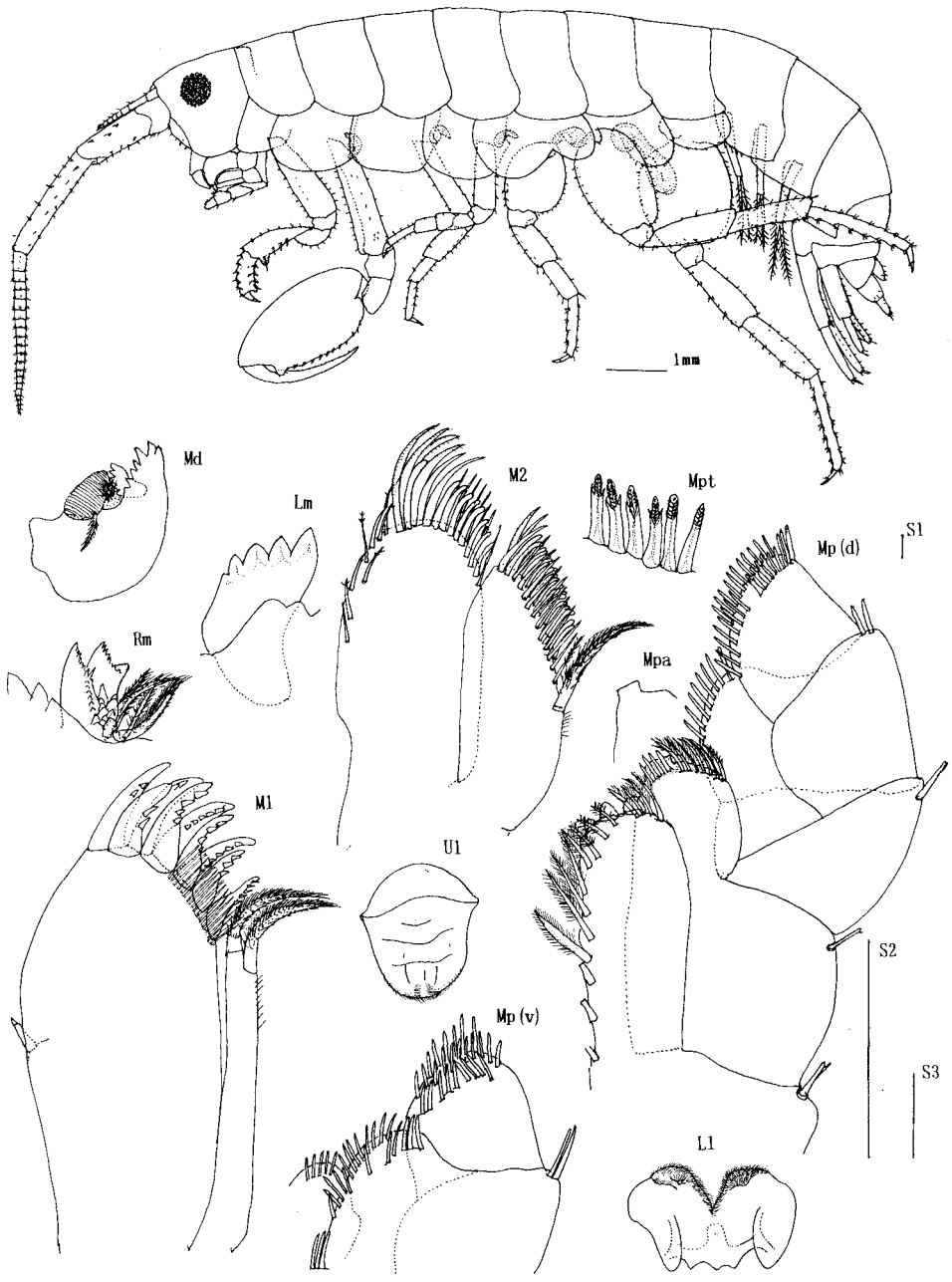

Fig. 7. *Talorchestia mindorensis* Oleröd, 1970 from Lu-Tao. Male, 13 mm long (TL81M211). A lateral view and mouth parts. Mpt: S1; Ll, Md, Ul: S2; Lm, M1, M2, Mpa, Mp(d), Mp(v) Rm: S3. S1=0.01 mm, S2=1 mm, S3=0.1 mm.

of peduncular article 4 of antenna 2; flagellum ca. 0.4 times as long as peduncle, 5-articulated. Antenna 2 is 0.5 to 0.7 times as long as body length; peduncular article 4 subequal to head length, peduncular article 5 ca. 1.5 times as long as peduncular article 4; flagellum 0.7

to 0.8 times as long as peduncle, 21 to 23-articulated.

Mouth parts same as *T. martensii* except maxilla 1 and maxilliped. Maxilla 1: saw-like spines of outer plate 2 to 6-denticulated. Maxilliped: inner distal corner of outer plate truncated, protruded into a lobe; palp article 3 with a transverse row of 6 spines, including 4 trident spines (Fig. 7 Mpt) on subdistal part of dorsal surface.

Gnathopod 1; carpus ca. 3.4 times as long as ischium; propod ca. 0.6 times as long as carpus, palm very short, ca. 0.4 times as long as dactyl base; both anterior and posterior margins of dactyl base rough, dactyl nail subequal to dactyl base in length. Gnathopod 2: coxal plate wider than deep, posterior cusp very small or indiscernible; inner anterodistal angle of basis protruded medially into a lobe, inner surface with a group of several spines on distal part; posterodistal angle of merus obtuse, weakly produced anteriorly; propod elliptic, subequal to basis and ischium combined in length, posterior margin 0.1 to 0.2 times as long as anterior margin, palmar margin very oblique, parallel to anterior margin and roughly serrated, with row of 8 to 10 spines along both sides and with a hummock-shaped protuberance near dactylar hinge; grasping margin of dactyl sinuous, weakly bulged near hinge, spinulose.

Pereopods 3: coxal plate as deep as wide, posterior cusp acute; merus longer than propod; carpus shortest, length 2.4 to 2.6 times as long as width; dactyl base ca. 0.5 times as long as ischium. Pereopod 4 ca. 0.7 times as long as pereopod 3; coxal plate larger than that of pereopod 3, posterior cusp weakly hooked, acute; merus slightly longer than propod; carpus shortest, length ca. 1.6 to 1.8 times as long as width; dactyl base subequal to that of pereopod 3 in length, strongly pinched, shoulder of depression protruded. Pereopods 5 to 7: articles increasing in length distally; posterior margin of each dactyl base rough. Pereopod 5 ca. 0.9 times as long as pereopod 3; anterior lobe of coxal plate larger than posterior one (ca. 2.0 times in width, ca. 1.5 times in depth); basis suboval, without posterodistal lobe; dactyl base slightly longer than that of pereopod 3. Pereopods 6 and 7: basis forming posterodistal lobe; anterior margins of merus and carpus with grouped spines; propod with 2 groups of 3 parallel spines on both sides of posterodistal angle. Pereopod 6 ca. 1.4 times as long as pereopod 3; basis longish oblong, both anterior and posterior margins weakly curved, posterodistal lobe slightly deep; propod ca. 1.2 times as long as carpus. Pereopod 7 slightly longer than pereopod 6; basis suboval, broader than that of pereopod 6, posteroproximal margin weakly concaved, posterodistal lobe deep; propod ca. 1.3 times as long as carpus; dactyl base slightly longer than that of pereopod 6.

Coxal gills: gill of gnathopod 2 wavy; gills of pereopods 3 to 5 sack-like; gill of pereopod 6 subequal to basis in length.

Abdominal side plate 1 with 4 to 6 spines on anterodistal angle. Posterior angle of each plate protruded into a small point.

Pleopods: peduncle of pleopod 1 slightly shorter than those of pleopods 2 and 3, with spines on inner and outer margins and surface of proximal part; peduncle of pleopod 2 with spines on both inner and outer margins; peduncle of pleopod 3 with spines on outer margin and surface; outer ramus 12 to 13-articulated; inner ramus 9 to 10-articulated.

Uropod 1: distolateral spine subequal to inner marginal spines of outer ramus in length; rami ca. 0.7 times as long as peduncle, outer ramus marginally bare, inner ramus with 6 spines on inner and outer margins respectively, both rami with distal spines. Uropod 2 ca. 0.6 times as long as uropod 1; rami ca. 0.7 times as long as peduncle, outer ramus with 2 outer marginal spines, inner ramus with 4 spines on inner and outer margins respectively, both rami with distal spines. Uropod 3: depth of peduncle ca. 2.0 times as long as that of ramus, with spines on distal and ventral part of outer surface; ramus ca. 0.6 times as long as peduncle, dorsal margin spinose, distal end with 8 spines of subequal length.

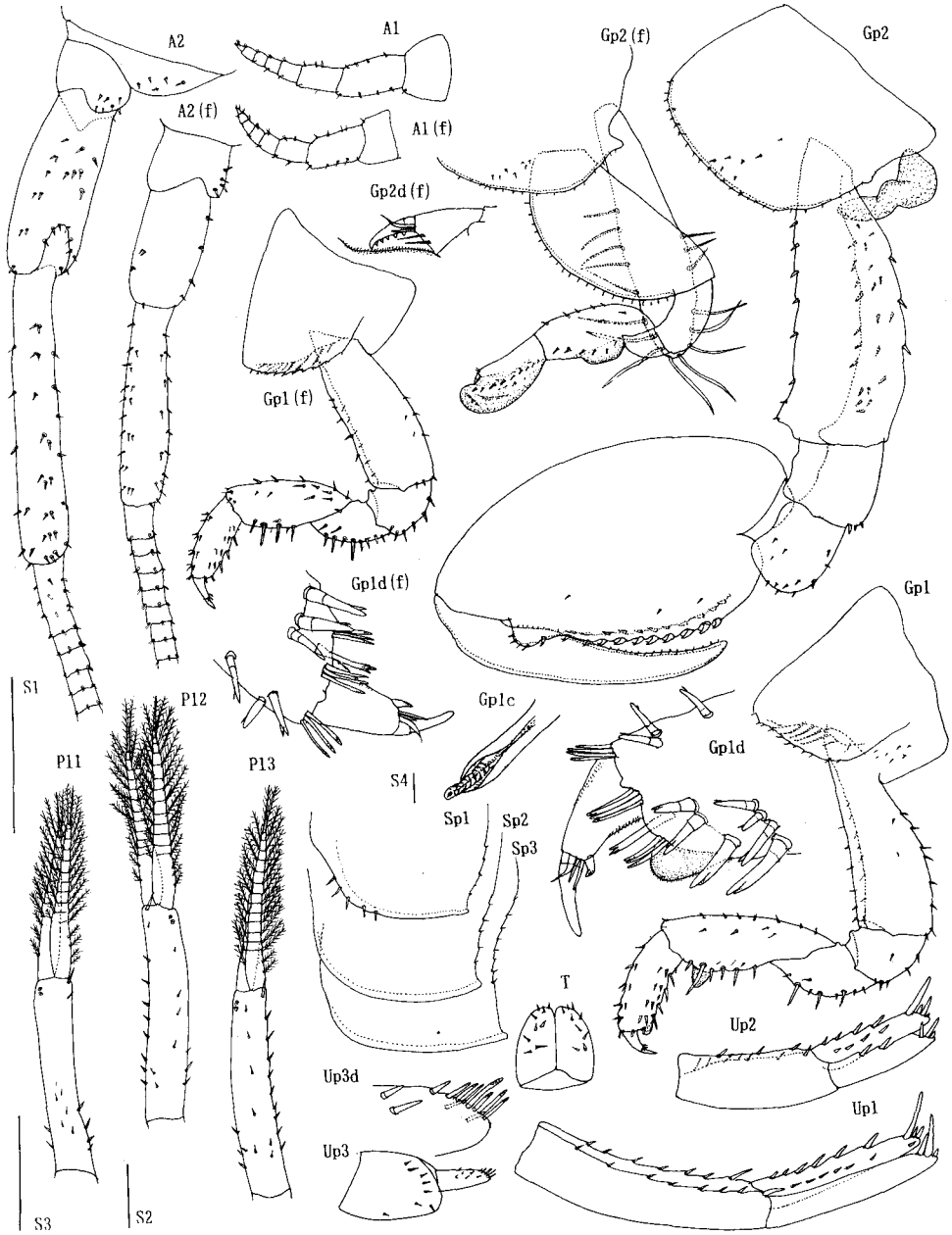

Fig. 8. *Talorchestia mindorensis* Oleröd, 1970 from Lu-Tao. Male, 13 mm long (TL81M211) and female (f), 11 mm long (TL81M221). A1, A1(f), A2, A2(f), Gp1, Gp1(f), Gp2, Gp2(f), P11–P13, Sp1–Sp3, T, U1–U3: S1; Gp2d(f): S2; Gp1d, Gp1d(f), U3d: S3; Gp1c: S4. S1=1 mm, S2=0.1 mm, S3=0.1 mm, S4=0.01 mm.

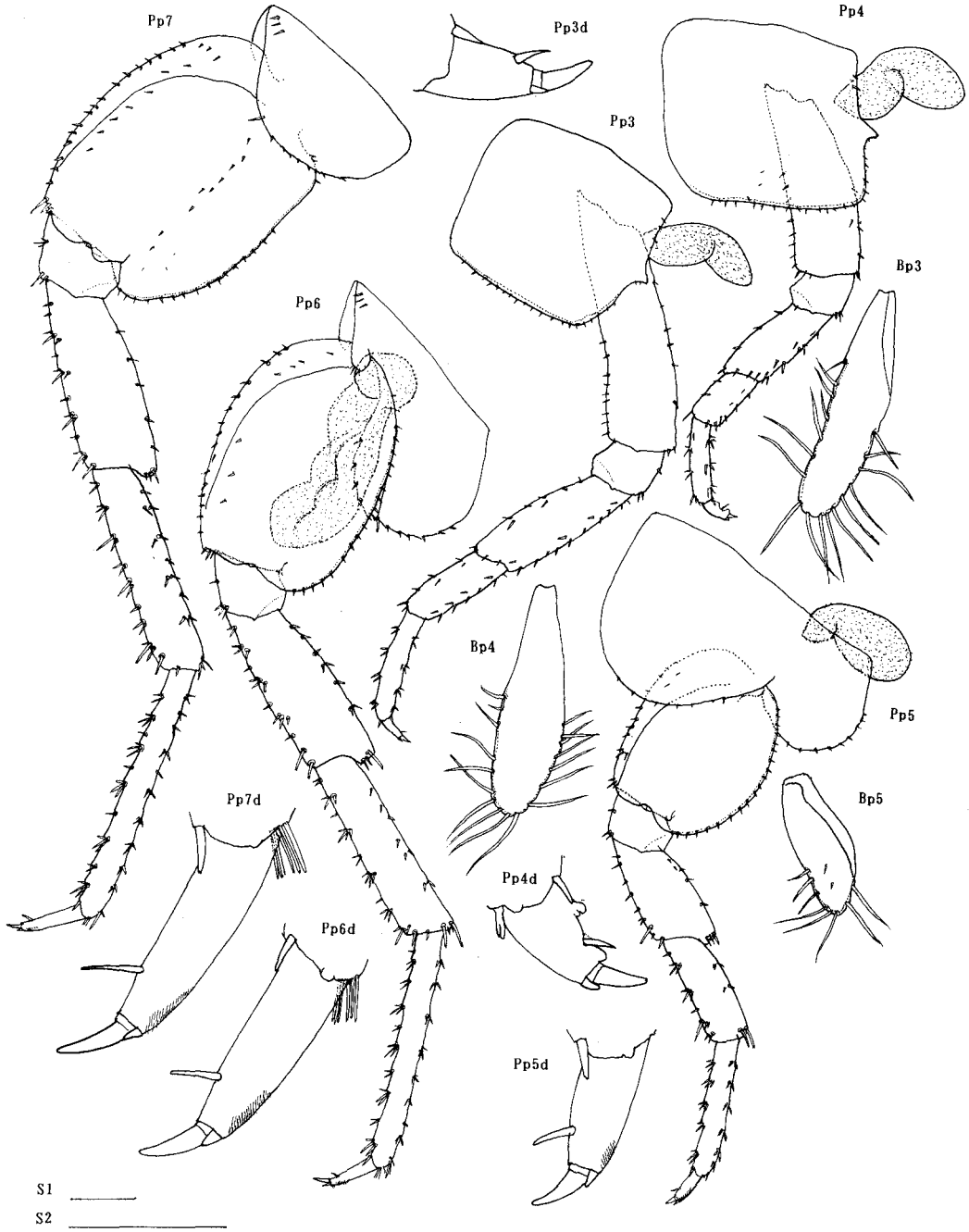

Fig. 9. *Talorchestia mindorensis* Oleröd, 1970 from Lu-Tao. Pereopods of male, 13 mm long (TL81M211) and brood plates of females, 11 mm long (TL81M221). Pp3d–Pp7d: S1; Bp3–Bp5, Pp3–Pp7: S2. S1=0.1 mm, S2=1 mm.

Telson ca. 0.6 times as long as uropod 3, with 8 to 10 spines marginally and facially on each lobe.

Female

Body length 9 to 11 mm. Antenna 1: flagellum ca. 0.5 times as long as peduncle, 5-articulated. Antenna 2 ca. 0.5 times as long as body length; peduncular article 4 ca. 0.7 times as long as head length, peduncular article 5 ca. 1.7 times as long as peduncular article 4; flagellum subequal to peduncle in length, 19 to 20-articulated.

Gnathopod 1: carpus and propod without tumescence; carpus ca. 3.0 times as long as ischium; propod ca. 0.6 times as long as carpus, slightly narrowing distally, palm defined by a group of 3 parallel spines, palm very short, ca. 0.3 times as long as width of dactyl base; posterior margin of dactyl base rough, dactyl nail ca. 0.6 times as long as base. Gnathopod 2: coxal plate as wide as deep, posterior cusp large, obtuse; basis expanded anteriorly, anterior margin spinose, posterior margin without spines; ischium slightly long; carpus ca. 1.8 times as long as ischium, tumescent posteroproximally; propod slightly shorter than carpus; dactyl nail denticulated (Fig. 8 Gp2d(f)).

Brood plates subequal to or slightly narrower than basis of pereopod 3 in maximum width. Plate of gnathopod 2 longest, with 13 to 17 setae; plate of pereopod 3 subequal to that of pereopod 4 in length, with 14 to 17 setae; plate of pereopod 5 shortest, with 7 setae on distal margin and 2 spines on surface.

Remarks

This species was originally described from Mindoro Island of the Philippine Archipelago by Oleröd (1970), but he did not describe female's features. Therefore, this is the first report describing the female. Male materials from Taiwan show the following differences from the original description: 1) the body length 13 mm or less (vs. 18 mm); 2) the flagellum of antenna 1 with 5 to 6 articles (vs. with 7 articles); 2) that of antenna 2 with 21 to 23 articles (vs. with 25 articles) and 2 or 3 proximal articles coalesced (vs. 5 or 6 proximal ones coalesced); 3) ratio of propod to carpus is 1.2 in pereopod 6 (vs. 1.3) and is 1.3 in pereopod 7 (vs. 1.5), and dactyl base of pereopod 7 ca. 1.1 times as long as that of pereopod 6 (vs. ca. 1.5 times); 4) posterodistal angle of merus of male gnathopod 2 rounded (vs. strongly curved, produced distally); 5) ventral margins of abdominal side plates smooth (vs. with shallow notch); 6) uropod 2 with 2 marginal spines on outer ramus (vs. with 3 spines) and 4 spines on inner and outer margin of inner ramus respectively (vs. with 3 inner and 2 outer marginal spines). These differences may be within variation in relation to the body length except for 4), 5) and 6).

T. mindorensis bears striking resemblance to *T. palawanensis* Morino & Miyamoto, 1988 among *Talorchestia* species. However, the former is distinguished from the latter by the following characters: 1) truncated inner distal corner of the outer plate of maxilliped protruded into lobe (vs. the truncated corner not protruded into lobe), 2) male gnathopod 2 with a hummock-shaped protuberance on the palm (vs. with an anteriorly directed protuberance), 3) the dactyl base of pereopod 4 pinched, the shoulder of depression strongly protruded (vs. weakly protruded), 4) pereopod 7 longer than pereopod 6 (vs. subequal to pereopod 6 in length), 5) the propod of female gnathopod 2 ca. 0.8 times as long as carpus (vs. ca. 0.5 times) and the grasping margin of the dactyl nail denticulated (vs. lacking the denticle).

Distribution of Taiwan

This species was found only on sandy shores of two localities: Lu-Tao (Nanliao) and the coast of the Nan Wan (Shatao) (Figs. 1 & 10).

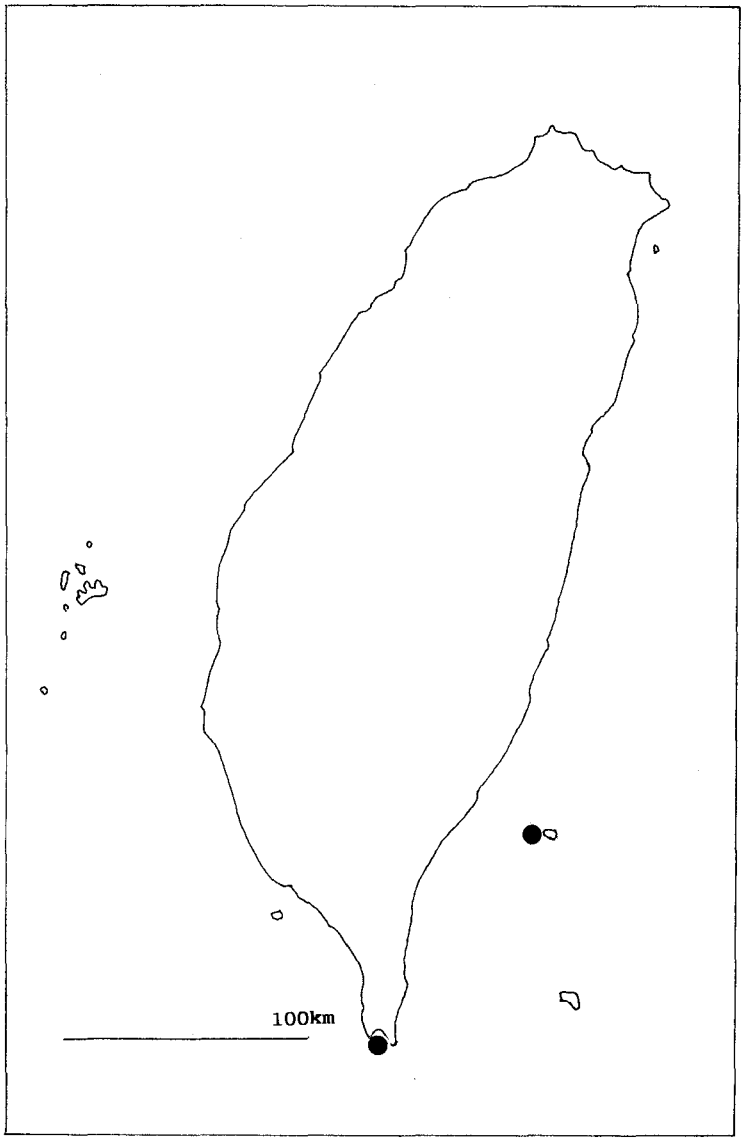

Fig. 10. Distribution of *Talorchestia mindorensis* Oleröd, 1970 in Taiwan.

Genus *Sinorchestia* gen. nov.

Diagnosis

Body slender, medium size, dorsal surface smooth. Eyes medium large. Inferior antennal sinus shallow. Antenna 1 exceeding 2/3 length of peduncular article 4 of antenna 2; peduncular article 2 subequal to peduncular article 3 in length; flagellum much shorter than peduncle. Antenna 2 sexually dimorphic; in male, peduncular article 3 protruded into peduncular plate ventrally, peduncular article 4 strongly incrassate, peduncular article 5 much longer than peduncular article 4; flagellum subequal to or shorter than peduncle; in female, peduncular plate small, protruded anteriorly.

Mandible, left lacinia mobilis 5 to 6-dentate. Maxilliped: palp article 2 with distinct mediodistal lobe; palp article 3 with a curved row of several spines (including trident spines) on dorsal surface; palp article 4 rudimentary, masked by spines, with a few spines on tip.

Coxal plate 1, anterodistal angle subacute. Coxal plate 2 with very small posterior cusp in male. Coxal plate 6, ventral margin of posterior lobe gently curved, spinose.

Gnathopod 1: propod with a strong collar tipped spine (Figs. 12 & 16 Gplc) alongside of dactyl base on inner surface, reaching distal end of dactyl base, with transverse rows of 3 or 4 stout bifid spines on outer surface; in male, carpus and propod with small tumescent hump on posterodistal angles, palm weakly oblique, with a group of 3 to 4 parallel spines between dactyl and tumescent hump; in female, carpus and propod without tumescent hump, palm defined by a group of a few parallel spines. Gnathopod 2: in male, propod with protuberance which defined palm and formed pocket to receive distal part of dactyl, palm with concavity and protuberance, dactyl slightly longer than palmar margin, grasping margin bulged at midpoint; in female, basis strongly expanded anteroproximally, posterodistal angle of merus with prominent lobe, carpus with shallow tumescent hump posteroproximally.

Pereopods 3–7 cuspidactylate, not sexually dimorphic; dactyl of pereopod 4 strongly pinched. Pereopods 5 to 7 more or less similar in form, each basis with posterodistal lobe; pereopod 5 short, subequal to pereopod 4 in length, with strong spines on both distal angles of carpus; pereopod 7 subequal to or slightly shorter than pereopod 6.

Abdominal side plates: posterodistal angle protruded posteriorly, acute.

Pleopods: peduncles with 2 retinaculae, without downward spine, peduncle of pleopod 3 shortest; rami multi-articulated.

Uropod 1 with small distolateral spine. Uropod 2, inner ramus longer than outer ramus. Uropod 3, ramus subequal to peduncle in length, distal end round, with 1 long, a few medium long and several short spines posteriorly.

Telson longer than wide, apically notched, with spines on distal part of each lobe.

Brood plates sublinear, with simple tipped setae marginally.

Type species: *Talorchestia sinensis* Chilton, 1925

Additional species: *Sinorchestia nipponensis* (Morino, 1972)

S. taiwanensis sp. nov.

Remarks

Sinorchestia is close to *Talorchestia* and *Trinochestia* Bousfield, 1982 which are common supralittoral talitrids in the northwestern Pacific region. These three genera have the following features in common: 1) the lacinia mobilis of left mandible 5 to 6-dentate; 2) the palp article 4 of maxilliped rudimentary or fuse to the palp article 3; 3) the propod and the carpus of male gnathopod 1 with small tumescent hump but those of female lacking hump and with very short palm; 4) pereopods 3 to 7 cuspidactylate, not sexually dimorphic; 5) the peduncle of uropod 1 with small distolateral spine; 6) brood plates sublinear, with simple tipped setae marginally. However, *Sinorchestia* is definitely distinguished from these and the other talitrid genera in having the following features: 1) the peduncular article 3 of antenna 2 with peduncular plate, which shows sexual dimorphism; 2) the propod of male gnathopod 1 with strong spine alongside of the dactyl base on inner surface, with a group of a few spines between the dactyl and the tumescent hump; 3) the propod of male gnathopod 2 with protuberance which defined the palm and formed pocket to receive distal part of the dactyl, the palm with concavity and protuberance; 4) the ramus of uropod 3 subequal to the peduncle in length, with several spines of unequal length on the round tip.

Distribution

The genus is confined to the temperate and subtropical west Pacific. Component

species of the new genus are collected on sandy shores of the Pacific coast of Japan and Taiwan, the coast of the Chinese continent and of the Taiwan Strait (ca. 22°N–ca. 40°N).

Sinorchestia sinensis (Chilton, 1925) comb. nov.

(Figs. 11–14)

Talorchestia sinensis Chilton, 1925; pp. 283–284, figs. a–d; Morino, 1972, pp. 47–53, figs. 1–5.

Material examined

4 males and 3 females (1 ovig.) from Demao, 18 Aug. 1981; 2 males from Fulung, 31 Jul. 1981.

Description of male

Body length 9 to 10 mm. Eyes round or suboblong. Antenna 1: flagellum ca. 0.3 times as long as peduncle, 5-articulated. Antenna 2 ca. 0.5 times as long as body length; peduncular plate tomahawk-shaped anterior margin almost straight, outer surface and ventral margin spinose; peduncular article 4 with a small protuberance at middle of ventral margin, slightly shorter than head length; peduncular article 5 slightly narrower and much longer than peduncular article 4 (ca. 2.0 times); flagellum ca. 0.7 times as long as peduncle, 18 to 20-articulated.

Upper lip deeper than wide, ventral margin and distal surface pilose. Lower lip broad, inner shoulder and margin of central trough pilose. Left mandible: incisor 6-dentate; lacinia mobilis 5-dentate, with 6 lifting spines. Right mandible: incisor 6-dentate; lacinia mobilis tricuspate, ridge minutely serrated, proximal part scaled, with 4 lifting spines. Maxilla 1: outer plate with 9 saw-like spines on distal margin, each spine 1 to 6-denticulated, with a row of 5 spines in parallel with saw-like spines on ventral side, palp minute, 2-articulated; inner plate narrow, with 2 long lifting spines distally. Maxilla 2: both distal margins of inner and outer plates with rows of sharp spines and smooth blunt spines, margin of inner plate with 2 lifting spines medially, terminal one strong. Maxilliped: inner plate with 3 unequal dents on distal margin, with lifting spines on outer distal angle, on inner and subdistal margins; lobe of outer plate shorter than basal height, with 5 to 6 lifting spines on distal margin, inner corner round; palp article 3 subconical, inner and distal margins spinose, with a curved row of 8 spines, including 6 trident spines (Fig. 11 Mpt) on dorsal surface, distal part of ventral surface with dense spines.

Gnathopod 1: basis subtriangular in cross section, anterior margin almost straight, spinose; posterior margin weakly curved, with several spines; carpus ca. 3.0 times as log as ischium, with tumescent hump on posterosubdistal angle, posterior margin with 4 to 5 spines evenly, penultimate one strong; propod ca. 0.6 times as long as carpus, slightly broading distally, outer surface with 4 transverse rows of 2 to 4 bifid spines (Fig. 12 Gp1d), the longest spine of distalmost row is the second spine from posterior margin, ca. 2.5 times as long as neighboring spines, but in other rows posteromost spine longest, with tumescent hump on posterodistal angle, palmar margin subequal to width of dactyl base in length, with a spine near dactylar hinge of its outer side; dactyl with a stiff spine on posterodistal angle, with 3 setae on margin, dactyl nail ca. 0.7 times as long as dactyl base, both margins smooth. Gnathopod 2: coxal plate as wide as deep, posterior cusp very small, obtuse, ventral and posterior margin spinose; inner surface of basis weakly concaved, U-shaped in cross section, posterior margin with several spines, anterior margin and surface with few spines; merus subequal to ischium in length, round posterodistal angle without prominent lobe in fully developed specimens, margin spinose; propod broadened distally, posterior margin ca. 0.5 times as long as anterior one, with several spines, palm with subtriangular protrusion near dactylar hinge and with a round protuberance (with 3 long and several short spines) near

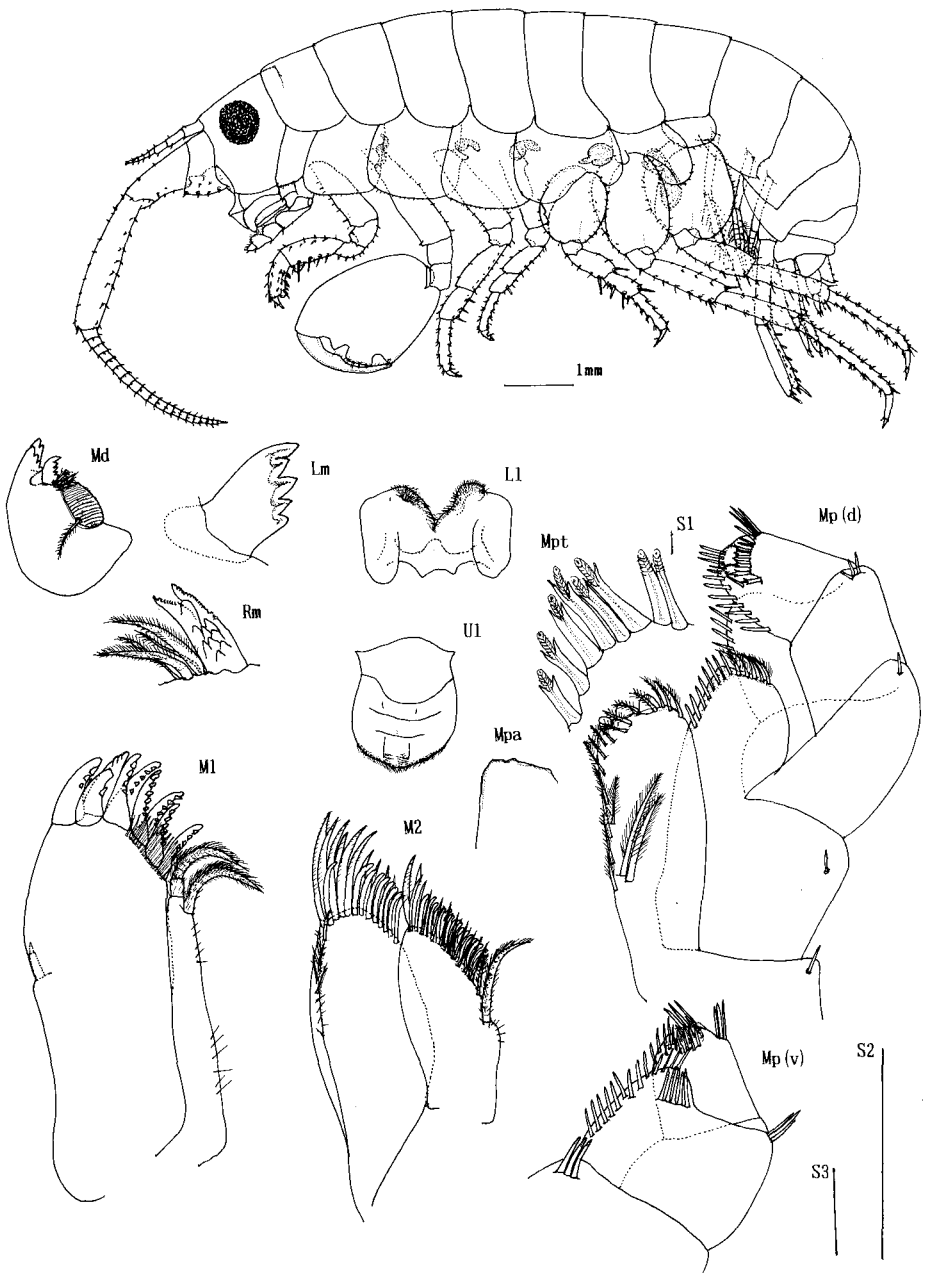

Fig. 11. *Sinorchestia sinensis* (Chilton, 1925) from Fulung. Male, 11 mm long (TF81M311). A lateral view and mouth parts. Mpt: S1; Ll, Md, Ul: S2; Lm, M1, M2, Mpa, Mp(d), Mp(v), Rm: S3. S1=0.01 mm, S2=1 mm, S3=0.1 mm.

defined protuberance of palm; dactyl bulged subtriangularly at midpoint of grasping margin.

Pereopods 3 to 7: propod with posterodistal spine, dactyl base with a stiff spine on concave margin. Pereopods 3 and 4: basis parallel sided; merus and carpus with dense

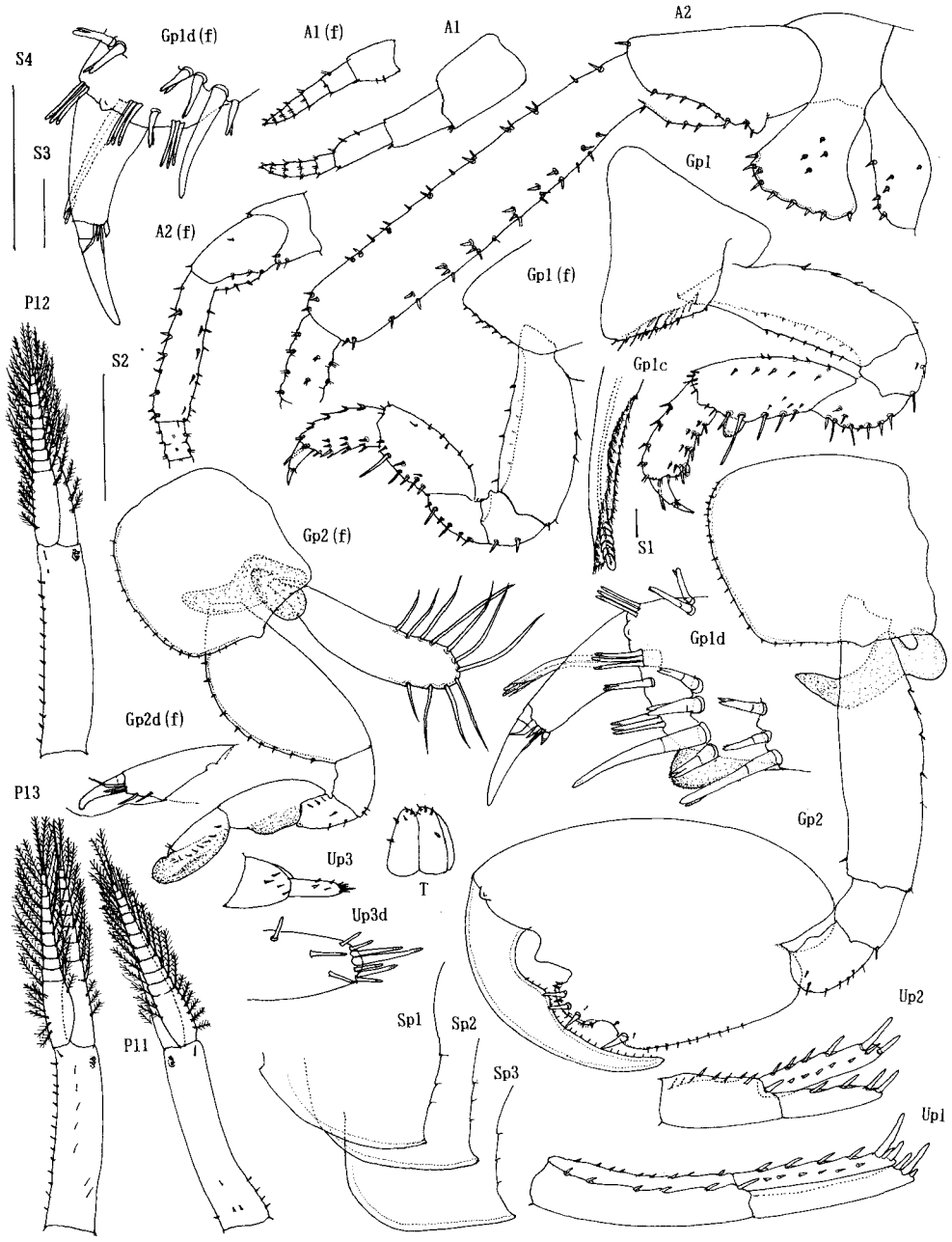

Fig. 12. *Sinorchestia sinensis* (Chioton, 1925) from Fulung. Male, 11 mm long (TF81M311) and female (f), 9 mm long (TF81M321). Gplc: S1; Gp2d(f): S2; Gp1d, Gp1d(f), Up3d: S3; A1, A1(f), A2, A2(f), Gp1, Gp1(f), Gp2, Gp2(f), P11–P13, Sp1–Sp3, T, Up1–Up3: S4. S1=0.01 mm, S2=0.1 mm, S3=0.1 mm, S4=1 mm.

spines on posterior margins, carpus shortest; dactyl base shorter than ischium. Pereopod 3: coxal plate slightly deeper than wide, posterior cusp small; merus longest; length of carpus ca. 2.0 times as long as width; dactyl base ca. 0.9 times as long as ischium. Pereopod 4

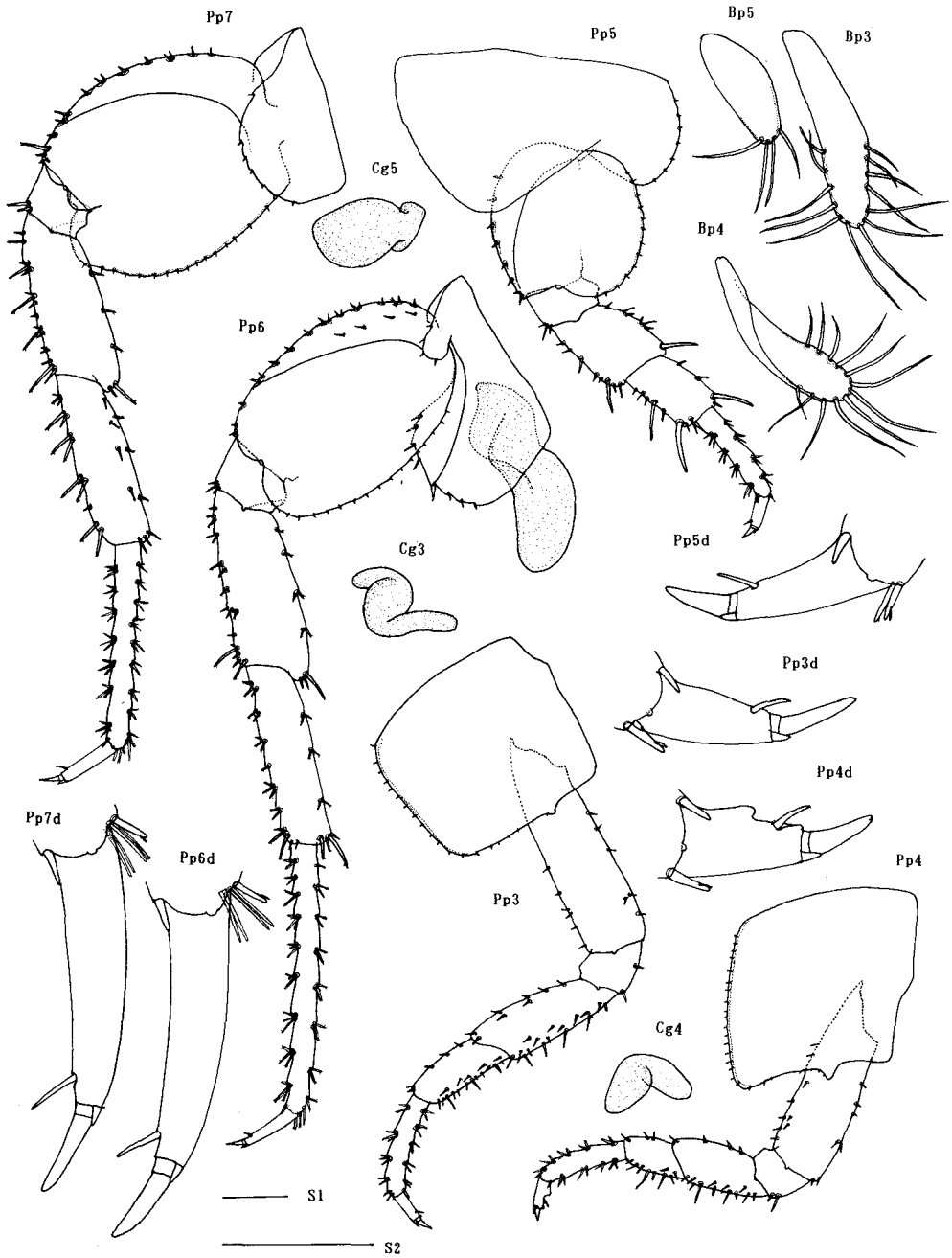

Fig. 13. *Sinorchestia sinensis* (Chilton, 1925) from Fulung. Pereopods of male, 11 mm long (TF81M311) and brood plates of female, 9 mm long (TF81M321). Pp3d–Pp7d: S1; Cg3–Cg5, Bp3–Bp5, Pp3–Pp7: S2. S1 = 0.1 mm, S2 = 1 mm.

ca. 0.8 times as long as pereopod 3; posterodistal angle of coxal plate slightly protruded posteriorly, posterior cusp acute; merus subequal to propod in length; length of carpus 1.4 to 1.6 times as long as width; dactyl base as long as that of pereopod 3, shoulder of

depression protruded. Pereopods 5 to 7: basis with posterodistal lobe, posterior margin with spines evenly, denser than those of anteromarginal one. Pereopod 5 ca. 0.8 times as long as pereopod 3; anterior lobe of coxal plate larger than posterior lobe (ca. 2.0 times in width, ca. 1.4 times in depth), ventral margin of anterior lobe strongly curved, with few spines, posterior lobe expanded posteriorly, margin spinose; basis circular; merus broadened distally, subequal to carpus in length; length of carpus ca. 2.0 times as long as width, with strong spines (Fig.13 Pp5) on both antero- and posterodistal angles and anterior margin, a longest spine of anterodistal angle ca. 0.5 times as long as propod; propod longest, narrow; dactyl base subequal to pereopod 3 in length. Pereopods 6 and 7: articles increasing in length distally; merus, carpus with sparse spines on posterior margin and long spines on both antero- and posterodistal angles; propod with 2 groups of 2 parallel spines on both sides of distal angle. Pereopod 6 ca. 1.6 times as long as pereopod 3; width of posterior lobe of coxal plate subequal to depth in length, ventral margin convex, spinose; basis suboblong, posterodistal lobe shallow; propod ca. 1.5 times as long as carpus; dactyl base subequal to ischium in length. Pereopod 7 ca. 1.4 times as long as pereopod 3; coxal plate shallow, ventral margin weakly convexed, spinose; basis suboval, expanded posteriorly, posterodistal lobe deep; anterior margin of merus and carpus with grouped spines including long spines; propod ca. 1.2 times as long as carpus; dactyl base subequal to that of pereopod 6 in length.

Coxal gills: gill of gnathopod 2 wavy; gills of pereopods 3 and 4 hooked in middle, narrowing distally; gill of pereopod 5 sack-like, broadened distally; gill of pereopod 6 largest, twisted in middle, unfolded distally.

Abdominal side plates: anterodistal angle rounded, without spines; posterior margin of side plate 1 convex but those of side plates 2 and 3 almost straight or slightly concave, spinose; posterodistal angles protruded posteriorly, acute.

Pleopods: peduncle of pleopod 1 with spines on proximal part; peduncle of pleopod 2 slightly longer than that of pleopod 1, with spines on outer margin except distal part; peduncle of pleopod 3 shorter than that of pleopod 1, with spines all along outer margin and on surface; rami slightly shorter than peduncles, outer ramus 12 to 13-articulated, inner ramus 9 to 10-articulated.

Uropod 1: peduncle with 2 rows of marginal spines; outer ramus ca. 0.7 times as long as peduncle, marginally bare, inner ramus with 4 and 6 spines on outer and inner margins respectively, both rami with 1 long and a few short distal spines. Uropod 2: ca. 0.6 times as long as uropod 1; peduncle with 2 rows of marginal spines; outer ramus slightly longer than peduncle, with 3 marginal spines, inner ramus ca. 1.2 times as long as outer ramus, with 4 and 5 spines on inner and outer margins respectively, both rami with 3 or 4 distal spines. Uropod 3 ca. 0.3 times as long as uropod 3; peduncle slightly longer than deep, spinose; ramus ca. 0.8 times as long as peduncle, with a few spines on dorsal margin and with 1 long and 2 medium-long, several short spines on round tip.

Telson ca. 0.7 times as long as uropod 3, with 9 to 10 spines marginally and facially on each lobe.

Female

Body length 9 mm. Antenna 1: flagellum ca. 0.4 times as long as peduncle, 4-articulated. Antenna 2: peduncular plate small, stretching forward; peduncular article 4 ca. 0.5 times as long as head length, lacking protuberance; peduncular article 5 ca. 1.6 times as long as peduncular article 4; flagellum slightly shorter than peduncle, 19-articulated.

Gnathopod 1: basis subtriangular in cross section, with many spines on both inner and outer anterior margin, posterior margin with a few spines; carpus and propod without

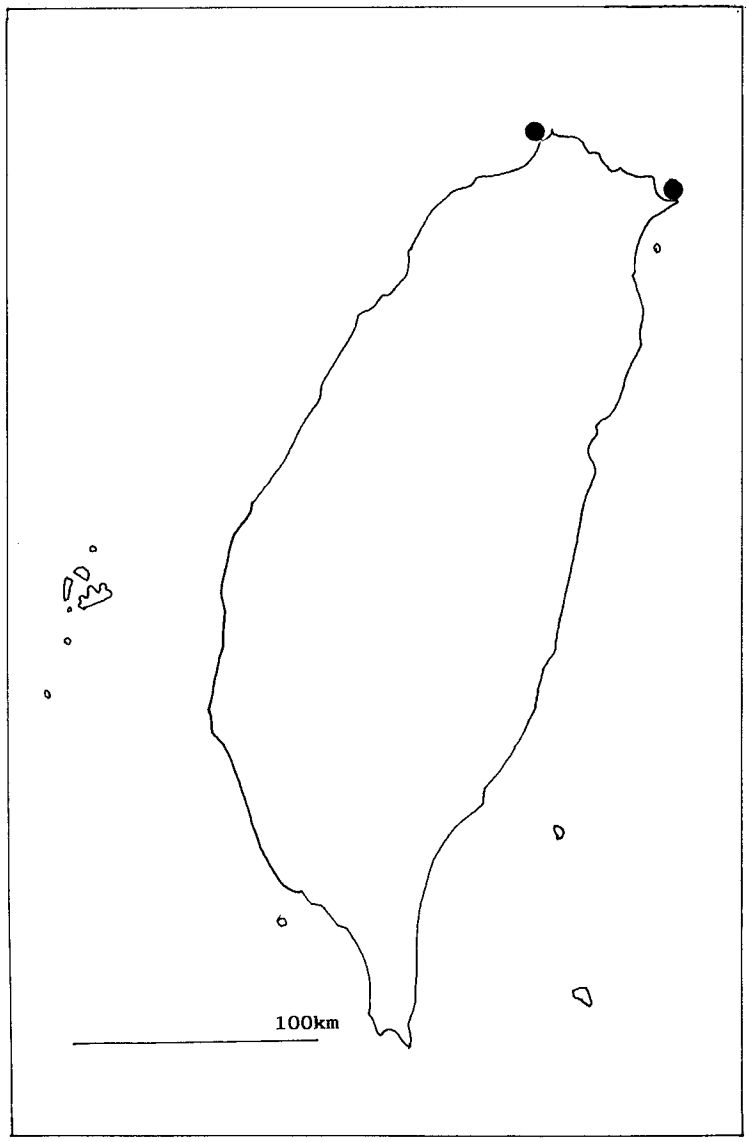

Fig. 14. Distribution of *Sinorchestia sinensis* (Chilton, 1925) in Taiwan.

tumescent hump; propod slightly narrowing distally, palm defined by a group of parallel spines, ca. 0.3 times as long as width of dactyl base; dactyl nail subequal to dactyl base in length. Gnathopod 2: coxal plate as wide as deep, posterior cusp small, obtuse; basis expanded anteriorly, anterior margin with spines evenly, posterior margin straight, without spines; merus subequal to ischium in length, with small prominent lobe (Fig.12 Gp2(f)) on posterodistal angle; carpus ca. 2.0 times as long as ischium, tumescent posteroproximally; propod ca. 0.8 times as long as carpus, tumescence extended far beyond dactyl, with spines-row on lateral surface; dactyl nail smooth.

Brood plates narrower than basis of pereopod 3 in maximum width, with 8 to 13 simple tipped setae on distal half margin; plate of pereopod 5 with 4 to 5 setae on distal

margin.

Remarks

The specimens from Taiwan agree with original description and figures from Amoi, China (Chilton, 1925), except the form of the palm of male gnathopod 2. He described the propod of male gnathopod 2 of the type as "palm longer than the hind margin and bearing a round lobe near the base of the finger followed by a round process with four stout spines....". And he showed the round lobe in his text figure. But the protrusion near the dactylar hinge of the specimens from Taiwan and Japan is definitely not a round lobe, but a subtriangular protrusion.

Morino (1972) described this species on the basis of the specimens from Japan and illustrated successive changes of secondary sexual characters of this species. The specimens from Taiwan agree with his description.

This species is distinguished from *S. nipponensis* by the following characters: 1) the peduncular plate of male antenna 2 with convexed ventral margin (vs. the margin with 2 concavities); 2) male gnathopod 2 with a subtriangular protrusion and a rounded protuberance on the palm (vs. bearing a plateau in middle of the palm); 3) pereopod 5 with a very long spine on inner distal angle of the carpus, the length is ca. 0.5 times as long as the propod (vs. ca. 0.3 times as long as the propod); 4) pereopod 6 ca. 1.6 times as long as pereopod 3 (vs. ca. 1.3 times) and the propod subequal to the basis in length (vs. 0.7 times); 5) abdominal side plate 1 without marginal spines on the anterodistal angle (vs. with several spines) 5) the outer ramus of uropod 1 marginally bare (vs. with the marginal spines).

Distribution in Taiwan

This species was found on sandy shore of the north coast (Demao, Fulung) of the main land (Figs. 1 & 14).

***Sinorchestia taiwanensis* sp. nov.**

(Figs. 15–19)

Material examined

26 males and 27 females from Hualien, 1 Aug. 1981,; 12 males and 23 females (3 ovig.) from Shuilien, 1 Aug. 1981,; 2 males and 7 females from Taitung, 2 Aug. 1981,; 1 male and 2 females (1 ovig.) from Shangwu, 3 Aug. 1981,; 8 males and 27 females from Naian, 14 Aug. 1981,; 5 males and 3 females (1ovig.) from Tachi 7 Aug. 1979.

Holotype: Male 13 mm (NSMT-Cr 9105) from Hualien, 1 Aug. 1981.

Paratypes from the same locality as holotype: Allotype, female 12 mm (NSMT-Cr 9106); other paratypes: NSMT-Cr 9107 (10 ♂♂), NSMT-Cr 9108 (8 ♀♀); NMC-C-1984-780 (5 ♂♂, 5 ♀♀); NMNS 2720–1 (2 ♂♂, 2 ♀♀).

Description of Male (holotype)

Body length 13 mm. Body color ivory and with 3 dark strips on dorsal surface of pleon in life.

Eyes subround. Antenna 1 reaching 4/5 of peduncular article 4 of antenna 2; flagellum ca. 0.4 times as long as peduncle, 5-articulated. Antenna 2 ca. 0.5 times as long as body length; peduncular plate tomahawk-shaped, anterior margin weakly concave, ventral margin and outer surface spinose; peduncular article 4 subequal to head length, very thick at middle, posterior margin with protuberance, anterior margin smooth; peduncular article 5 ca. 1.7 times as long as peduncular article 4, anterior and posterior margins spinose; flagellum

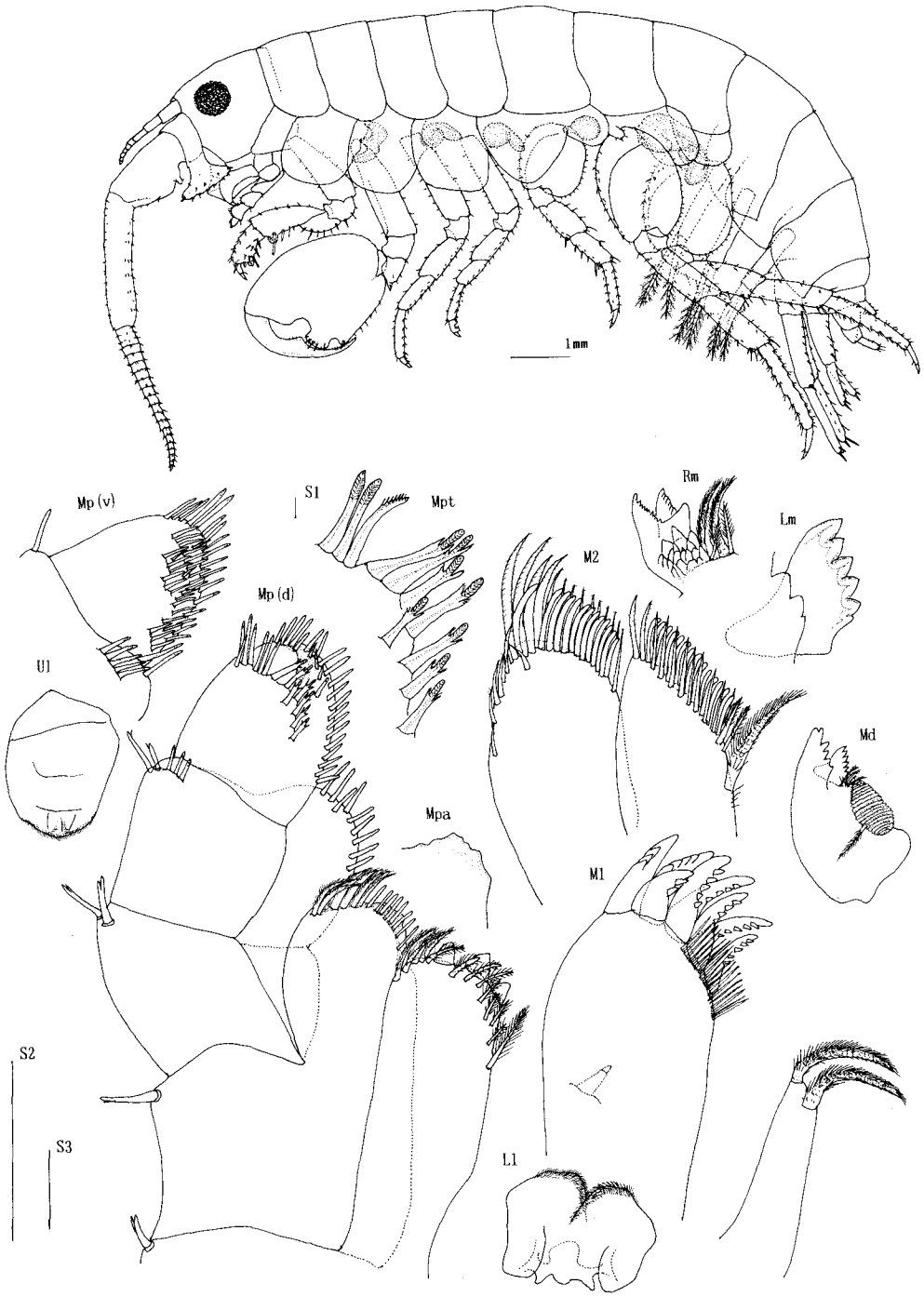

Fig. 15. *Sinorchestia taiwanensis* n. sp. from Hualien. holotype (male, 13 mm long). A lateral view and mouth parts. Mpt: S1; Ll, Md, Ul: S2; Lm, M1, M2, Mpa, Mp(d), Mp(v), Rm: S3. S1=0.01 mm, S2=1 mm, S3=0.1 mm.

ca. 0.7 times as long as peduncle, 21-articulated.

Left mandible: lacinia mobilis 6-dentate. Maxilla 1: saw-like spine with 2 to 6 denticles. Maxilliped: lobe of outer plate shorter than basal height, with 6 lifting spines on distal margin, inner distal corner truncated; palp article 3 with a curved row of 11 spines including 8 trident spines (Fig. 15 Mpt) near base of palp article 4 of dorsal surface, ventral surface with dense spines in rows on inner submargin.

Gnathopod 1: carpus ca. 3.3 times as long as ischium; propod ca. 0.5 times as long as carpus, with 3 transverse rows of 3 to 4 bifid spines on posterior side of outer surface, a posteromost spine in each row longest (ca. 1.6 times as long as neighboring spines), palm ca. 0.8 times as long as width of dactyl base, without a spine near dactylar hinge of its outer side; dactyl nail shorter than dactyl base. Gnathopod 2: coxal plate deeper than wide, posterior cusp distinct, obtuse; merus subequal to ischium in length, posterodistal angle with small prominent lobe; anterior margin of propod convex, smooth, posterior margin ca. 0.5 times as long as anterior margin, straight, with several spines, palm oblique, with a deep concavity near the middle and with a round protuberance (with 3 long and several short spines) near defined protuberance; dactyl with triangular bulge at middle of grasping margin, spinulose.

Pereopods 3: coxal plate deeper than wide, posterior cusp large; carpus shortest, length ca. 2.4 times as long as width; propod shorter than merus; dactyl base ca. 0.6 times as long as ischium. Pereopod 4 ca. 0.8 times as long as pereopod 3; coxal plate slightly larger than that of pereopod 3, posterior margin slightly oblique, posterior cusp acute; merus subequal to propod in length; length of carpus ca. 1.7 times as long as width; dactyl base subequal to that of pereopod 3 in length, shoulder of depressed base not protruded. Pereopods 5 to 7: articles increasing in length distally. Pereopod 5 subequal to pereopod 3 in length; anterior lobe of coxal plate larger than posterior lobe (ca. 1.5 times in depth, ca. 1.7 times in width), ventral margin strongly convex, anterior margin of posterior lobe straight, smooth, posterior margin spinose; basis strongly expanded posteromedially, anterior margin with several grouped spines, with posterodistal lobe; carpus slightly longer than merus, with long spines on antero- and posterodistal angles and anterior margin, longest spine ca. 0.4 times as long as propod; dactyl base slightly shorter than ischium. Pereopods 6 and 7: propod with 2 groups of 2 parallel spines on both side of distal angles; dactyl base slightly longer than ischium. Pereopod 6 ca. 1.4 times as long as pereopod 3; basis elliptic, posterodistal lobe shallow; propod ca. 1.2 times as long as carpus. Pereopod 7 slightly shorter than pereopod 6; basis suboval, posterior margin expanded posteriorly, broader than that of pereopod 6, posterodistal lobe shallow; propod ca. 1.1 times as long as carpus; dactyl base subequal to that of pereopod 6 in length.

Coxal gills: gill of gnathopod 2 wavy; gill of pereopod 3 small, hooked in middle, narrowing distally; gill of pereopod 4 hooked, sack-like; gill of pereopod 5 sack-like, broadened distally; gill of pereopod 6 largest, twisted in middle, tongue-shaped.

Abdominal side plate 1 without spines on anterodistal angle. Abdominal side plates 2 and 3: posterior margin weakly concave, spinose, posterodistal angles protruded posteriorly.

Pleopods: rami subequal to peduncles in length, outer rami 14 to 15-articulated, inner rami 12 to 13-articulated. Peduncle of pleopod 1 subequal to that of pleopod 2 in length, with spines on outer margin and surface of proximal part; peduncle of pleopod 2 with spines on outer margin except proximal part; peduncle of pleopod 3 with spines all along outer margin and on surface.

Uropod 1: rami ca. 0.7 times as long as peduncle, inner ramus with 6 spines on outer and inner margins respectively, outer ramus marginally bare, both rami with distal spines. Uropod 2 ca. 0.6 times as long as uropod 1; outer ramus ca. 0.9 times as long as

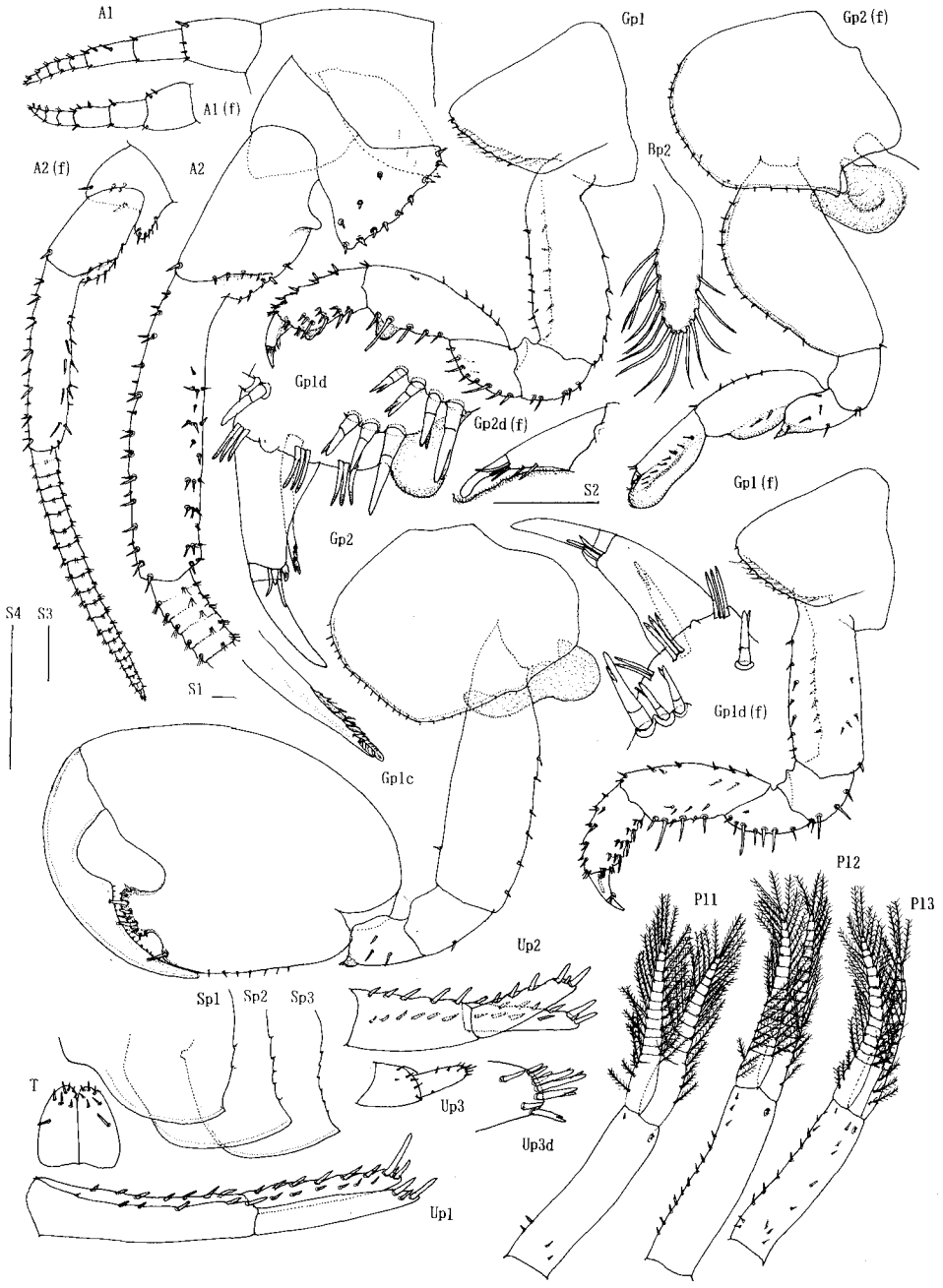

Fig. 16. *Sinorchestia taiwanensis* n. sp. from Hualien. holotype (male, 13 mm long), and allotype (female, 12 mm long). Gp1c: S1; Gp2d(f): S2; Gp1d, Gp1d(f), Up3d: S3; A1, A1(f), A2, A2(f), Gp1, Gp1(f), Gp2, Gp2(f), P11–P13, Sp1–Sp3, T, Up1–Up3: S4. S1=0.01 mm, S2=0.1 mm, S3=0.1 mm, S4=1 mm.

peduncle, with 4 marginal spines, inner ramus ca. 1.1 times as long as outer ramus, with 4 and 5 spines on outer and inner margins respectively, both rami with distal spines. Uropod 3 ca. 0.3 times as long as uropod 1; peduncle longer than depth, ramus subequal to peduncle

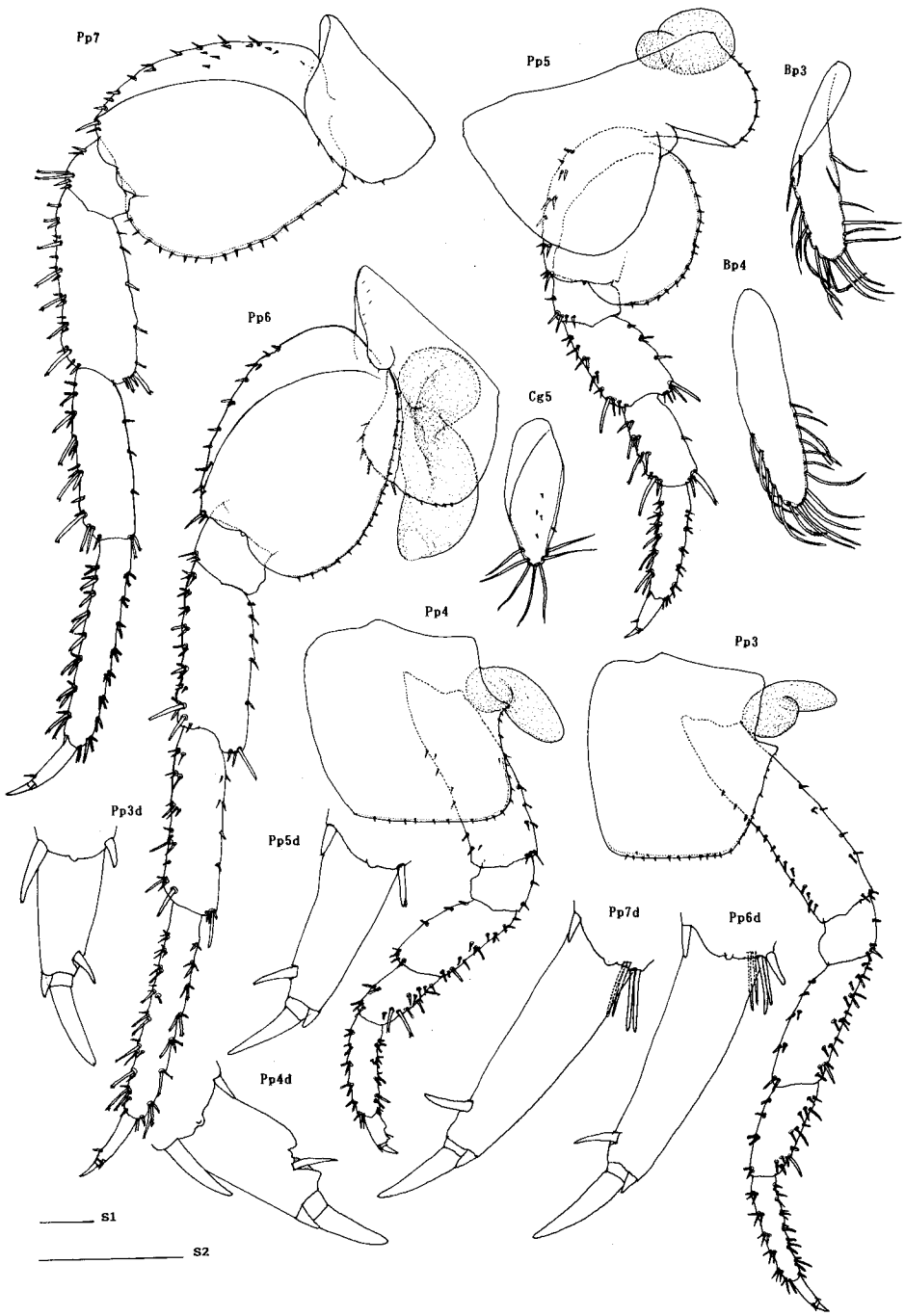

Fig. 17. *Sinorchestia taiwanensis* n. sp. from Hualien. Pereopods of holotype (male, 13 mm long) and brood plates of allotype (female, 12 mm long). Ppd3–Ppd7: S1; Bp3–Bp5, Pp3–Pp7: S2. S1=0.1 mm, S2=0.1 mm.

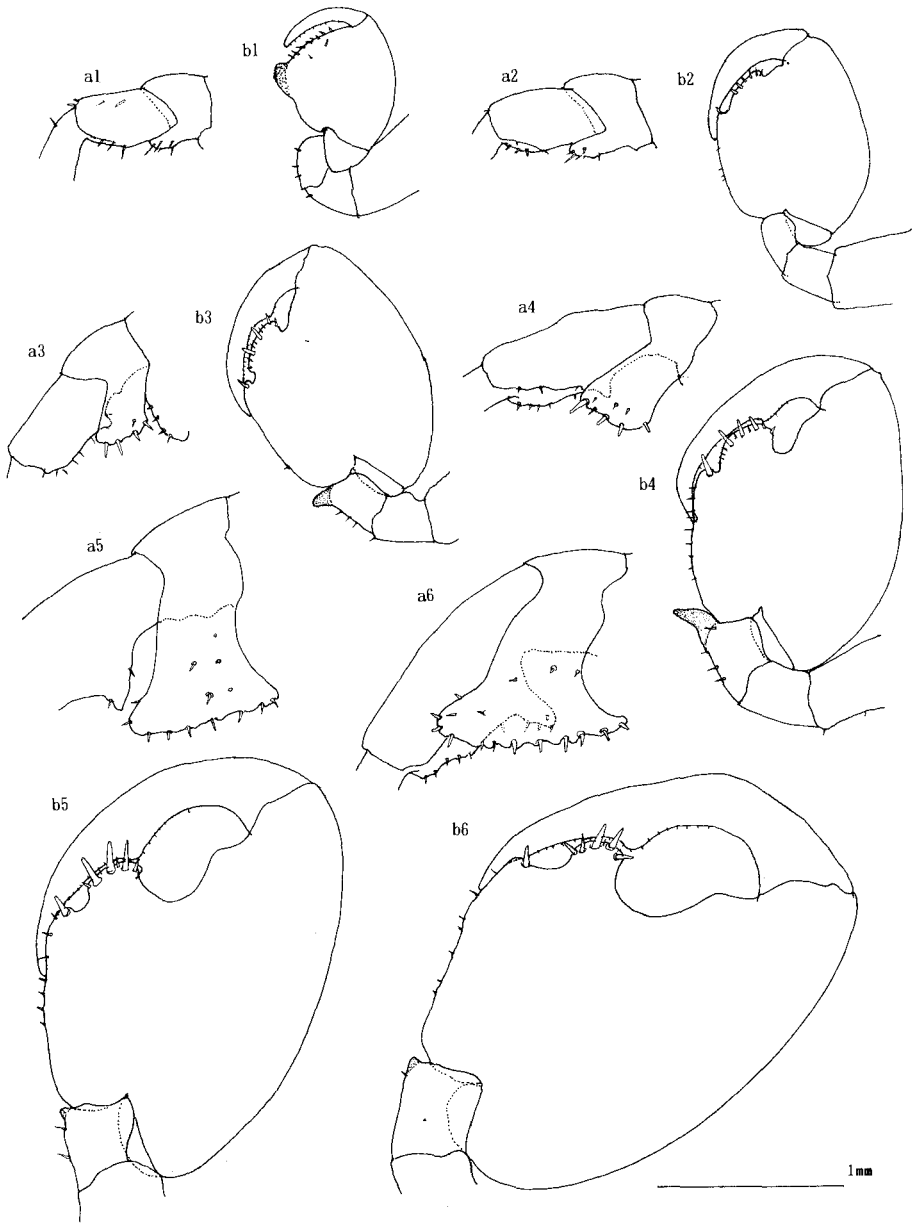

Fig. 18. *Sinorchestia taiwanensis* n. sp. from Hualien. Variation in the forms of peduncular plates of antenna 2 and gnathopod with development in male. a, peduncular plate of antenna 2; b, gnathopod 2; 1, body length 5 mm; 2, 7 mm; 3, 9 mm; 4, 10 mm; 5, 11 mm; 6, 12 mm.

in length, with 3 spines on dorsal margin, with 1 long , 3 medium long and 5 short spines on distal end.

Telson ca. 0.8 times as long as uropod 3, with 7 spines distally and facially on each lobe.

Female (allotype)

Body length 12 mm. Antenna 1 exceeding peduncular article 4 of antenna 2, flagellum ca. 0.4 times as long as peduncle, 4-articulated. Antenna 2: peduncular article 4 ca. 0.5 times

as long as head length, peduncular article 5 ca. 1.7 times as long as peduncular article 4; flagellum ca. 0.8 times as long as peduncle, 21-articulated.

Gnathopod 1: carpus and propod without tumescent hump on distal angle; propod ca. 0.6 times as long as carpus, a collar tipped spines (Fig.16 Gp1d(f)) not reaching distal end of dactyl base, palm defined by a group of 2 parallel spines, ca. 0.5 times as long as width of dactyl base; dactyl nail ca. 0.7 times as long as dactyl base. Gnathopod 2: coxal plate deeper than wide, posterior cusp strongly protruded; basis expanded anteroproximally, anterior margin with spines evenly; merus shorter than ischium, prominent lobe triangular shaped; carpus ca. 2.0 times as long as ischium, with hallow tumescence posteroproximally; propod ca. 0.9 times as long as carpus.

Brood plates: plate of gnathopod 2 shorter than that of pereopod 3, with 14 setae on distal half margin; plate of pereopod 3 subequal to that of pereopod 4 in length, with 18 setae; plate of pereopod 4 with 17 setae; plate of pereopod 5 shortest, with 7 setae on distal margin.

Remarks

S. taiwanensis shows variation in the following characters: the forms of peduncular plate of male antenna 2 and the palm of male gnathopod 2, the number of the teeth of lacinia mobilis of left mandible. These variations are partially correlated with the body length. The form of the peduncular plate and the palm (especially the size and shape of the concavity) of male gnathopod 2 seems to accomplish its transformation at 11 mm in body length, as shown in Fig. 18. This is also the case of the number of the teeth of lacinia of left mandible. The lacinia of specimens more than 11 mm in body length were with 6th tooth in both sexes, but that of specimens less than 11 mm without 6th tooth or with a rudimentary one.

Sinorchestia taiwanensis is very close to *S. sinensis*, but the new species is distinguished from the latter by the following features: in male antenna 2, 1) the peduncular article 4 very thick at the middle (vs. evenly thick), 2) the peduncular article 5 ca. 1.7 times as long as the peduncular article 4 (vs. ca. 2.0 times); in the propod of male gnathopod 1, 1) the longest one among 3 spines of the distal transverse row is posteromost one (vs. the spine is the second one from the posterior margin), the length is ca. 1.6 times as long as the neighboring spines (vs. ca. 2.5 times), 2) palm without a spine near dactylar hinge of its outer side (vs. with a spine); in male gnathopod 2, 1) merus with prominent tumescent lobe (vs. without lobe), 2) the palm with a deep concavity on the middle, but without a subtriangular protrusion near the dactylar hinge (vs. with the protrusion, but without the concavity); in pereopods 6 and 7, bases with shallow posterodistal lobes (vs. with deep posterodistal lobe).

Distribution in Taiwan

This species was found on gravel or sandy shores of the Pacific coast of the mainland (Tachi, Hualien, Shuilien, Taitung, Shangwu) and Yuweng Tao of the Peng Hu Lie- Tao (Naian) (Figs. 1 & 19).

Acknowledgments

The authors wish to express their gratitude to Dr. W.-H. Chou, the National Museum of Natural Science of Taiwan for co-operation in this study of Taiwanese talitrid amphipods. The authors wish to thank Dr. E.L. Bousfield, formerly Royal British Columbia Museum for his helpful advice and to Drs. S. Yamato and S. Kubota, Seto Marine Biological Laboratory, Kyoto University for their helpful comments on the manuscript.

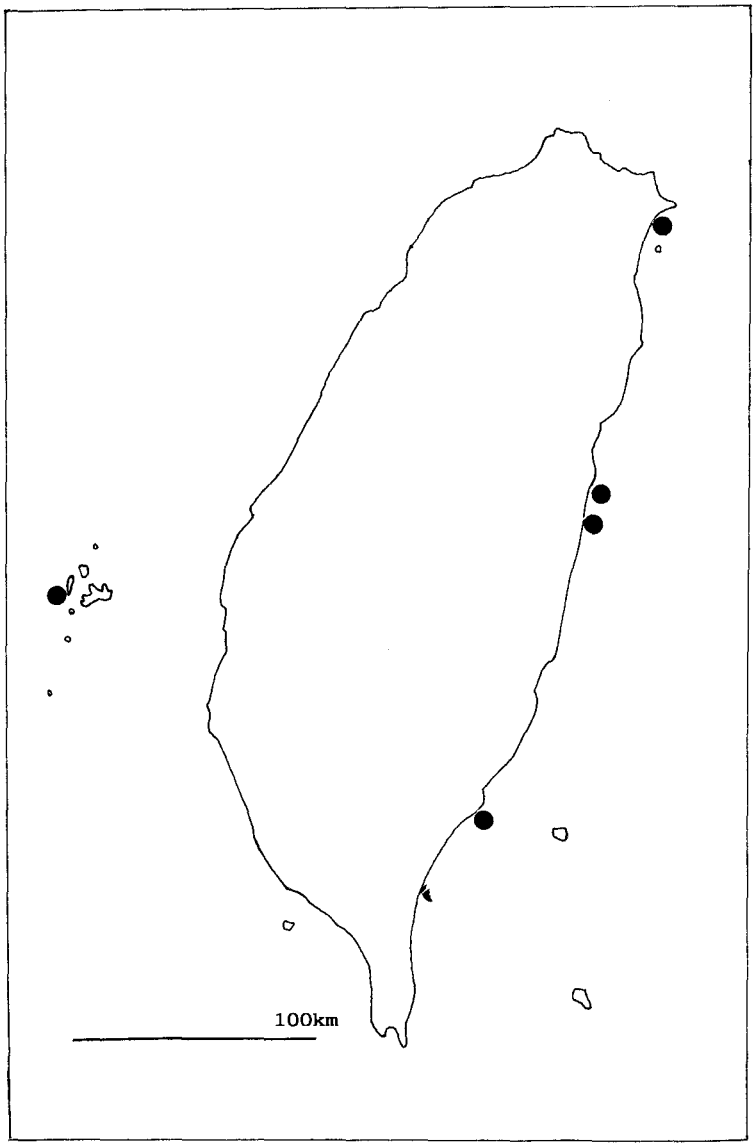

Fig. 19. Distribution of *Sinorchestia taiwanensis* n. sp. in Taiwan.

References

Bellan-Santini, D. & Ruffo, S. 1991. Un nouveau Talitridae de corse: "*Talorchestia*" *ugolinii* n. sp. (Crustacea, Amphipoda). Vie Mil., 41: 189–194.

Bousfield, E.L. 1982. The amphipod superfamilly Talitridae in the northeastern Pacific region. 1. Family Talitridae: systematics and distributional ecology. Publ. Biol. Oceanog., Natl. Mus. Nat. Sci., 11: i-vii, 1–71.

Bousfield, E.L. 1984. Recent advances in the systematics and biogeography of landhoppers (Amphipoda: Talitridae) of the Indo-Pacific region. In: Radovsky, F.J., Raven, P.H., (Ed.). Biogeography of the tropical Pacific. Bishop Mus. Spec. Publ., 72: 171–210.

Bousfield, E.L. 1991. New sandhoppers (Crustacea: Amphipoda) from the Gulf coast the United States. Gulf. Res. Rep., 8(3): 271–283.

Chilton, C. 1921. Fauna of Chilka Lake: Amphipoda. Mem. Indian Mus., 5: 521–558.

Chilton, C. 1925. On a species of *Talorchestia*. China J. Sci. Art., 3: 283–284.

Chou, W.-H. & Lee, J.-D. 1996. A new terrestrial amphipod (Crustacea) from a subtropical forest in Taiwan, with description of a new genus. Bull. Natl. Mus. Nat. Sci. Taiwan., 8: 43–54.

Dana, J.D. 1852. Crustacea, Part II. Exploring expedition during the years 1838–1842, under the command of Charles Wikes, U.S.N., 14: 686–1018.

Iwasa, M. 1939. Japanese Talitridae. J. Fac. Sci. Hokkaido Imp. Uni., Ser. VI.: 255–296, pls. IX-XXII.

Morino, H. 1972. Studies on the Talitridae (Amphipoda, Crustacea) in Japan 1. Taxonomy of *Talorchestia* and *Orchestoidea*. Publ. Seto Mar. Biol. Lab., 21: 43–65.

Morino, H. & Miyamoto, H. 1988. Redefinition of *Talorchestia* (Amphipoda: Talitridae) with description of a from the tropical west Pacific. J. Crust. Biol., 8: 91–98.

Oleröd, R. 1970. Littoral gammaridean Amphipoda from Mindoro, the Philippines. Zool. Anz., 184: 388–394.

Stebbing, T.R.R. 1906. Amphipoda. 1. Gammaridea. Das Tierreich 21: i-xxxix, 1–806.

Tanaka, K. (Ed.). 1982. Grand New World Atlas. 62 map plates. Zenkyozai Co. Ltd., Tokyo.

Weber, M. 1892. Die Süsswasser-Crustacean des Indischen Archipels. Zool. Ergebn. Reise Niederl. Ost-Ind., 2: 528–571.